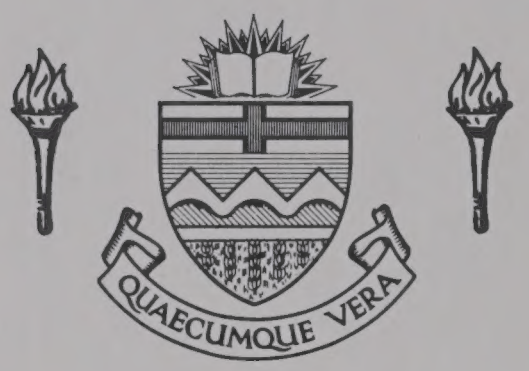

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THE UNIVERSITY OF ALBERTA

PREDICTING GROUP MEMBERSHIP FOR LEARNING DISABLED AND CONTROL SUBJECTS WITH SELECTED COGNITIVE AND AFFECTIVE MEASURES

by

BOB FISK

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entiled Predicting Group Membership for Learning Disabled and Control Subjects with Selected Cognitive and Affective Measures submitted by Bob Fisk in partial fulfilment of the requirement for the degree of Master of Education in Educational Psychology.

Abstract

This research was undertaken to determine which psychoeducational measures used in schools, or combination of them, are most effective in identifying learning disabled children. Relationships were investigated among a number of predictor variables (intelligence, achievement, locus of control, self-concept, perceptual-motor ability, and a teacher rating scale) with group membership in either a control group ("normal students") or a learning disabled group. The study employed some of the psychoeducational instruments currently used by psychologists to identify learning disabled pupils in Alberta schools. The literature on predictors of school achievement suggests that consideration be given to both cognitive and non-cognitive constructs. Some such measures with theoretical and empirical support were included in the study.

The data were analyzed using step-wise multiple regression analyses, and Hotelling T^2. One regression analysis was conducted using academic achievement test results as the criterion variable. A second regression analysis was performed using group membership in either the control or learning disabled population as the criterion. Finally, Hotelling T^2 was used to examine differences between the two groups on the various predictors.

In reviewing the results, the teacher rating scale emerges as a consistently important measure. In the regression analysis predicting achievement, cognitive variables appear to account for the greatest amount of variance. The analysis predicting group membership suggests that the battery was less effective. It was concluded that a child's membership in either group is primarily a function of how his teacher perceives him, although achievement and some non-intellectual factors also appear to be involved. Other cognitive measures appear to contribute little towards the prediction of a learning disability.

An examination of the definition of a learning disability appears warranted, as does recognition of the heterogeneity of the learning disabled population. The overall power of this testing battery is discussed.

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Chapter 1

Introduction and Statement of the Problem

Psychologists and educators are concerned with predicting the academic success of students. They have never been able to ignore the child who does not perform well in school. Inadequate academic performance diminishes the student's ability to function in an ever more demanding marketplace (Glaser, 1974). Since the 1920's educational psychologists have tried to determine and explain individual differences in student achievement. Early researchers concerned themselves primarily with the measurement of intellectual abilities (Crandall, Katkovsky, and Preston, 1962), and the results of intelligence tests were used to predict students' academic achievement. Some success was realized with this approach and researchers recognized that intelligence did, to a degree, determine one's learning capacity. However, attempts to increase the predictability of achievement led researchers to consider a number of other variables which could interact with the intellectual component (Brookover, Paterson, and Thomas, 1962).

Because the initial cognitive focus yielded an incomplete description of achievement, psychologists in the 1950's began to examine the role that personality variables might play in affecting academic achievement. It became increasingly common for studies in this area to consider a variety of nonintellectual influences (Ahammer and Schaie, 1970), as no single variable seemed adequate to account for the differences between a student's actual and predicted performance. Increasingly sophisticated research

methologies acknowledged the multiple causes of achievement (Asbury, 1974). Some of the variables investigated were self-concept, locus of control, and perceptual-motor performance, as well as intelligence.

Since the early 1960's, there has been developing a widespread interest in aiding children with learning difficulties. Substantial effort has been expended to try to identify potential candidates for additional teaching resources. However, Asbury (1974) notes that relatively little research has been conducted regarding the prediction of academic success at the elementary school level. This area deserves attention, because the earlier a learning problem is identified and remediation started the greater is the likelihood for success (Bryan and McGrady, 1971; Boniferro, 1975; Baren, Liebl and Smith, 1978).

Though schools serve many important functions, the principle expectation of most educators is that pupils learn the 'basics' - reading, writing and arithmetic. When students succeed in their programs, little attention is given to the factors that account for that success. It is only when students are failing or have a recognized learning disability that it becomes necessary to examine the psychological factors which impede academic progress.

When students are experiencing such difficulties, they are typically referred to a school specialist such as a counsellor or school psychologist. These professionals, in keeping with psychological theory and Department of Education requirements,

usually administer a battery of psychoeducational instruments in an attempt to determine the nature and the extent of dysfunction. Psychological testing plays a central role in the identification and remediation processes. In addition, testing is useful for making comparisons among individuals in a population. Psychological assessments assume both a comparative and a diagnostic function in the school.

Individually administered tests such as the Wechsler Intelligence Scale for Children - Revised or the Illinois Test of Psycholinguistic Abilities are time consuming and thus limit the number of potentially learning disabled candidates that can be screened. Researchers therefore have tried to develop group-administered screening batteries which provide a more efficient approach to assessment (Ohlson, 1978).

In addition to the economy of effort involved, group screenings offer the advantage of typically being administered in the classroom where the child is expected to learn. They may thus reflect real life performance more accurately. Disadvantages of group screenings are (1) academic achievement tests are usually the major screening device, and thus "underachievers" become labelled "learning disabled", (2) group screenings often measure only academic areas, (3) group screenings do not normally assess behavior problems, and (4) important cognitive, perceptual and language functions are not measured (Buktenica, 1971).

This study again raises the question as to what extent nonintellectual factors are important in predicting academic

success for students, especially students currently defined as learning disabled.

A further purpose of this study is to try to maximize the advantages of group screening procedures and minimize the disadvantages. This research attempts to determine which psychoeducational measures, or combination of them, used in the school selection procedure, are most effective in identifying the learning disabled child. The relationships among a number of predictor variables and membership in either the control group ("normal" students) or the learning disabled group is investigated.

This study was conducted with elementary school students in grades four to six. The assessments were made under representative classroom conditions. This research employed some of the psychoeducational instruments currently used in the schools, as well as some recently developed and theoretically supported instruments. It was anticipated that more definitive statements might be made regarding the identification and subsequent placement of learning disabled students, by examining differences, as measured by these scales, between the two groups. Results from this study could provide school personnel with new guidelines for designing an effective test battery with which to assess, with greater predictive certainty, the learning disabled child.

Historical Perspectives

Learning difficulties have been investigated by a diversity of disciplines and a number of theories have consequently

developed. This chapter outlines the development of some of these hypotheses and discusses how they have contributed to the study of learning disabilities. Of central importance is the problem of defining "learning disability", for this determines, to a large extent, the approaches undertaken in this field. The following section traces the roots of the movement and leads to a discussion of the current definition.

Sabatino (1976) notes that the field has proceeded through three developmental phases: foundation, transition, and integration stages.

The foundation phase existed from the early 1800's to the mid 1930's. The medical profession placed a major emphasis on the pathogenesis and etiology of specific learning disorders. Clinical studies on brain damaged adults provided information used to explain learning disorders. Numerous studies attempted to determine which areas of the brain controlled what learning acts (Bryan and Bryan, 1978).

Another approach emerging late in this period was that of Freudian psychology. For several decades hence, educators viewed learning problems as psychogenic manifestations of inner conflict (Ohlson, 1978). Succeeding this psychodynamic approach to explanations of learning were the pioneers of the transitional phase. Strauss and Lehtinen (1947) studied brain damaged children, and found that children having learning problems could have suffered brain damage, and accordingly their problems could be organic rather than solely genetic as previously believed (Bryan and Bryan, 1978). The neurophysiological work of these early

researchers is supported by Cruickshank (1979) who stresses that all learning is neurologically based. Because learning involves the neurological system, it is assumed that a learning dysfunction is a manifestation of defects in the neurological system. Cruickshank (1979) emphasizes the relationship between motor functions and neurological processes. Neurological problems lead to processing deficits from which learning difficulties emerge. Learning difficulties then are symptoms of a neurophysiological dysfunction that can occur at any age or any intellectual level.

Closely related to the neurophysiological research is the area of language development. Historically the diagnosis of learning disabilities has not involved the role of language as there has been a lack of theoretical literature on its development (Turton and Clark, cited in Turton, 1975). However, learning difficulties do encompass language problems, either spoken or written. Turton (1975) views language acquisition as one of the most sensitive measures of one's development. He views a language difficulty as a discrepancy between a child's acquisition of higher-order cognitive and linguistic skills and lower-order perceptual and motor skills. It is often assumed that perceptual skills precede language acquisition. The neurophysiological position however views speech, language, and motor functions as higher-order functions which interact with other skills.

What became obvious to special educators in the mid-fifties was that groups of children other than those with mental retardation were not achieving academically (Sabatino, 1976). Many of these children appeared to possess normal intelligence. However, researchers at this time had generally operated within a medical model which focused on physiological explanations. Still, it was of questionable validity to extend this model to learning problems for which the physiological basis was unknown. The difficulty was in determining the biological roots of personality and educational problems (Bryan and Bryan, 1978). Attempts to localize brain damage were not fruitful. Brain injured children could have learning problems, but not all children having learning problems could be shown to have brain damage.

By the late fifties educators began to adopt a more pragmatic view of the problem and the focus shifted from a neurological medical model to an educational one. Educators had difficulty using the medical model for several reasons. First, evidence of neurological problems was elusive. Second, the terminology used was foreign to most educators. Finally, such a diagnosis offered little help in the design of instructional strategies (Wallace and McLoughlin, 1975).

Lack of hard evidence supporting the neurophysiological position led to the rejection of terms implying organic impairment (Chapman, Boersma, and Janzen, 1978). At this time Kirk and Bateman (1962) introduced the term 'learning disabilities'. The focus now was upon educational considerations. This model, basically psychological in nature, substituted educational for

neurological perspectives. Bateman (1965) later revised the term to include a "discrepancy factor" to describe the gap between intellectual potential and achievement. This discrepancy notion has since become a hallmark of most learning disability definitions (Chalfant and King, 1976).

The trend away from an organic explanation to a psycho-educational one has had two effects. First, the term 'learning disabilities' became increasingly accepted and acknowledged by educators, and this resulted in rapid expansion of programs. Concurrently, a host of concepts were appended to the term 'learning disabilities' resulting in the label becoming an umbrella term for a wide array of learning and behavior problems (Chapman, Boersma and Janzen, 1978). This resulted in a pervasive confusion as to what actually constitutes a learning disability. Furthermore, there does not appear to be a single etiological explanation for learning disabilities (Cott, 1977).

The foundation in the United States of the Association for Children with Learning Disabilities (ACLD) in the mid-sixties was an impetus for gathering together many theories in an attempt to explain the problem. With the diversity of contributors to the field of learning disabilities, accord has yet to be realized. Confusion may be attributed to the competition among theories about the phenomenon, and among the disciplines involved. Psychologists, neurologists, psychiatrists, special educators, and pediatricians all have a vested interest in the field (Sabatino, 1978; Baren, et al., 1978). Because each investigation

approaches the problem with the terminology with which it is most conversant, intercommunication among the related contributing disciplines has been hampered. Information does not pass freely between the specialties involved.

According to Wiederholt (cited in Sabatino, 1976) we are now in the third or integration phase of the study of learning disabilities. Educators have, of necessity, adopted an electic approach. They have accepted the label without a concensus regarding its theoretical foundation. Difficulties still revolve around the lack of a well defined terminology and of a common background. The singular point of agreement is that a discrepancy exists between a child's expected achievement and his actual ability (Bryan and Bryan, 1978).

The definition employed in this study is that adopted by the County of Strathcona No. 20, which closely parallels the definition formulated by the American National Advisory Committee on Handicapped Children (1968). The County definition, taken from the Alberta Department of Education Guidelines reads as follows:

> A learning disabled child is one who manifests an educationally significant discrepancy between his tested intellectual potential and actual level of performance. This discrepancy may be evidenced in the areas of understanding or using language, spoken or written, which in turn may manifest itself in imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. This discrepancy will not be caused by mental retardation,

educational or cultural deprivations, severe emotional disturbance, or sensory loss.

The definition implies certain necessary characteristics as indicative of a learning disability. The child must have an academic achievement deficit. There must be a significant apparent difference between what a child is capable of and what he is actually doing. His observed achievement level must be significantly lower than that expected considering his mental ability. Visual or auditory perceptual problems can manifest themselves in the reception or expression of language. Another characteristic of most definitions, but not the one above, is that a deficit in perceptual performance is involved. The definition also assumes the child to be operating at or above the normal intellectual range. The final characteristic contains the exclusion clause, which rules out other handicapping conditions such as mental retardation, cultural deprivation, severe emotional disturbances, or visual or auditory deficits (Sabatino, 1976).

Chapter 2

Review of the Literature

It is the responsibility of educators to teach all the children who enter their classrooms. In practice, teachers tend to teach to the average student, spend extra effort with those experiencing difficulties, and let the high achievers go their own way. In the last two decades, increased attention has been given to that segment of the student population that is failing. There are numerous reasons why a student may experience difficulty. Problems may be psychological, physical, emotional, neurological, cultural, or environmental, but regardless of the causes, educators are challenged to provide an education of the highest quality for each individual (Baren, Liebl and Smith, 1978).

Prior to the 1960's, educators seemed to be experimenting with the content of various curriculums, gradually changing the focus from a strictly scholastic orientation to a more humanistic one. Increased attention was given to the individual pupil, relative to the content or program the student was expected to master. This was a period of rapid technological expansion and a general concern was emerging regarding the skill level required for one to be successfully employed upon completion of his formal schooling. This contributed to a greater awareness of the problems of those who were failing in spite of average intellectual abilities. The issue escalated in importance in 1957, when Russia successfully launched its first Sputnik. America was

dismayed, and many people looked to the schools for an explanation of our apparent technical inferiority. Critics maintained that the schools were too soft, that they weren't challenging the more able students, and that they were placing too much emphasis upon personality adjustment (Doll and Fleming, 1966). The post-Sputnik era saw increased attention being placed upon educational achievement, with particular emphasis given to "under-achievers" (Ohlson, 1978).

These seemingly bright yet failing students received attention from a variety of disciplines, each looking at some facet of the problem and each contributing what it could to the identification and remediation of these children. Researchers pursued numerous directions, investigating specific aspects of the problem. Psychometric studies accounted for a substantial proportion of the investigations conducted, and grew from single cognitive predictors of achievement to diverse test batteries for measuring a number of indices of achievement.

Historically, the earliest predictor of academic success was intellectual ability, or intelligence quotient (IQ). In the 1930's researchers began to give some consideration to the role of the social and affective domains in academic performance (Ahammer and Schaie, 1970). By mid-century, researchers were wrestling with the problem that academic under-achievers often score at average or better levels on tests of intelligence (Fink, 1962). It seemed that intelligence alone could not account for under-achievement. Investigators thus began to

consider special aptitudes and personality traits (Cattell and Butcher, 1970).

As a number of personality variables began to receive attention, it appeared that a child's academic success was not to be determined by any single criterion (Curry, 1961; Williams and Cole, 1968; Ahammer and Schaie, 1970; Asbury, 1974). Efforts to improve the prediction of academic success by including nonintellectual measures, helped lead to an appreciation of the diversity of influential factors. Writers reported on test-bias, emotional disturbance, numerous personality variables, cultural deprivation, organic brain damage, biographical characteristics, motivation, home background, the interaction of individual with his environment, differences in cognitive style and cognitive tempo, socioeconomic status, maturity, teaching, and school facilities (Carnes and Doughtie, 1966).

This study investigates certain cognitive and non-cognitive variables as predictors of academic achievement. The discussion in this chapter begins with the initial criterion used for measuring academic success-intelligence. The intelligence test is a cornerstone in identifying the learning disabled child. This is followed by discussion of another variable typically used to identify such children - performance on visual-motor tasks. The non-cognitive factors of self-concept and locus-of-control are reviewed as well. The final section of this chapter overviews the literature on teacher rating scales.

Intelligence

Few educators or researchers would challenge the general notion of intelligence being a primary index of academic achievement. Traditionally, intelligence has served as the most used and most reliable predictor of achievement. At the turn of the century, Alfred Binet was commissioned to develop an objective screening instrument whose purpose was to identify the slower students in French schools. The test proved to be effective and it became the accepted method to verify everyday observations and predictions about a student's probable performance. Researchers since Binet have found that intelligence generally correlates well with school success (Brooks, 1977). Flescher (1963) confirmed that intelligence is related to scholastic performance at the elementary school level, which is the focus of the present study.

An area of academic achievement often investigated because of its importance in the schooling process is that of reading. Jones (1969) investigated whether reading achievement scores could be predicted from intellectual scores. He administered the Lorge-Thorndike Intelligence Test and a number of reading achievement tests to fourth grade and sixth grade students. The results indicated that intelligence correlates with all aspects of reading achievement in both grade levels at the .01 level of significance. A similar investigation was conducted by Mendelsohn (1972) who collected intellectual and achievement data on two different reading approaches with 350 grade four students. The data revealed that reading scores increased as

the intelligence level increased, regardless of the reading method employed. This confirms the persistent observation that achievement is positively related to mental ability (Mendelsohn, 1972).

Many studies have related measures of intelligence to other areas of academic school achievement. The significance of cognitive predictors is reflected in Clifford and Cleary's (1972) remark when they refer to IQ as "... the indestructible and multi-purpose variable...". In one study, intelligence was correlated with student's marks in grades two to seven. The resulting correlations were found to be quite consistent across grades, averaging about .65 (Hinkleman, 1955). This general finding is supported by Knief and Stroud (1959), Lavin, (1965), Edwards and Tyler (1965), Jones (1969), Black (1971) and Orme (1975). Researchers report the correlation of intelligence to achievement as ranging from a low of .31 (Barnes, 1955) to a high of about .85 (Bloom, 1964). On the whole, such studies indicate a correlation of about .70 between intelligence and achievement (Barton, Dielman and Cattell, 1972). In sum, many intelligence scores are good predictors of school performance. They do provide information about who is likely to do well academically (Bryan and Bryan, 1978).

If the average correlation coefficient is approximately .70, then about 50% of the variance in achievement scores is accounted for by using intelligence as a predictor. Investigators have therefore examined which additional variables warrant consideration. Since the early sixties a substantial amount of investigation has related personality factors to achievement (Cattell

and Butcher, 1968). It appears that intellectual achievement is dependent upon a number of determinants, which are personality traits rather than cognitive abilities (Kohn, 1974). In a similar vein, Black (1971) acknowledges the importance of assessing the intellectual level of learning disabled children, but suggests that causal factors other than intelligence be thoroughly investigated as well. Ahammer and Schaie (1970) administered personality questionnaires and an achievement test to 104 third and 114 sixth graders to determine which personality factors best predict achievement. As expected, intelligence had the highest correlation. They also found several significant correlations of personality factors (i.e., Ego Strength) with achievement. Kahn (1969) used the Metropolitan Achievement Test as a criterion variable, and found several affective components (such as need achievement and achievement anxiety) that substantially increased the predictive power of cognitive measures. These results suggest that cognitive and personality variables complement each other and that including both yields greater predictability than either type of measure used alone. There appears to be an important relationship between personality variables, intelligence, and academic achievement (Cattell and Butcher, 1968; Gable, Roberts and Owen, 1979). The current feeling among researchers is well summed up by Ahammer and Schaie (1970) who state:

> It is a common sense notion that academic success is not solely determined by intelligence or general ability, but that personality characteristics play an important role as well. (p. 193)

Visual Motor

Psychologists seeking to predict academic achievement give considerable attention to the visual-motor domain. They commonly include some visual-motor assessment in their test battery when seeking to identify learning disabled students. The theoretical origins of this area are derived from a recognition of the mutual interdependence of the mind and body (Ismail, 1969). This position recognizes that neither cognitive nor physiological factors can stand alone, but rather, they interact to influence the overall functioning of the individual. Perceptual-motor ability is therefore viewed as an important factor in learning, especially in early childhood where it is thought to influence subsequent concept development.

Educators have developed numerous programs to aid children experiencing learning difficulties, particularly in the area of reading, and many programs concentrate upon the motor skills of the child as they relate to reading difficulties (Elkind and Debblinger, 1969). The justification for this approach is derived from Piaget's (cited in Chissom, 1971) theory of perceptual development. This position states that one develops by a process of delayed or accelerated interactions with the environment. Motor skills contribute to these interactions, and visual-motor skills play a central role in the overall process.

Many educators explaining the relationship between perceptual-motor skills and school achievement speculate that deficits in visual perception may contribute to academic failure. This notion is founded upon both clinical experience and empirical

research (Larsen and Hammill, 1975). It is thought that to perceive a motor task correctly, all structures of the nervous system must be intact and fully developed (Ismail, 1969). The assumption then, is that perceptual motor tasks are dependent upon the interaction between the sensory processes and the motor responses, which in turn are mediated by cerebral functions. A dysfunction in any of these areas may cause a breakdown in the perceptual or motor effectiveness of the individual. Perceptual-motor training attempts to improve both the perceptual and motor areas.

When comparing academic achievement and perceptual-motor ability, researchers generally report a low positive correlation. Skubic and Anderson (1970) investigated the relationship among perceptual-motor skills, academic achievement and intelligence in grade four children. They found that scores on the perceptual-motor battery correlated significantly with the Stanford Achievement Test ($r = .57$) and with the California Test of Mental Maturity ($r = .49$). In another study, Elkind and Debblinger (1969), using Piaget's rationale, found perceptual activity can be improved with training. This in turn aids reading skills. Apparently if a child perceives his environment with distortion, then his academic learning may well be difficult regardless of his intelligence (Coleman, et al., 1968). Although the precise nature of the relationship between perceptual-motor ability and intelligence is yet to be determined, researchers do report a positive relationship (Ismail, 1969; Austin and Postlethwaite, 1974). Chissom (1971) found a significant relationship between motor skills and academic achievement for boys in the first grade.

Children with visual-perceptual deficits usually score lower in academic achievement (Getman and Hendrickson, 1966). Vision and visual-motor functions are central to a child's experience, and a child who is unable to integrate visual and motor skills has a potential learning problem (Lawrence and Potter, 1970). Further, Gamsky and Lloyd (1971) found that children who evidence such deificts tend to also exhibit poor classroom behavior. It may be that they find academic work frustrating and thus compensate with negative behavior. Coleman (1968) expresses concern about the number of children who may have visual perceptual deficits that remain undetected. They advise educators to analyze visual-perceptual skills to discover areas of dysfunction, and try to attenuate the frustration these children experience with their school work.

Intelligence and achievement tests alone do not tap the visual-motor function adequately. To assess perceptual-motor development in children, psychologists have typically employed some type of form-copying test. Of the instruments available, the Bender Gestalt Test has been the most popular (Ryckman and Rentfrow, 1971; Crary and Rigway, 1971). Research has shown the Bender performance of children at school entry to correlate significantly with later school achievement (Keogh and Smith, 1967). Duffy, Egeland and Dinello (1972) investigated the relationship of intelligence, pscyholinguistic ability, and visual-motor skills to achievement in third to fifth graders. They found visual-motor skills to be the only variable contributing to achievement for each grade level as measured by the Iowa Test of Basic Skills.

Koppitz (1964) cites correlations between the Bender and achievement in the .50 - .70 range. She also maintains that the test is more closely related to overall school functioning and achievement in arithmetic than it is to reading.

In an investigation of Bender protocols with learning disabled boys, Ackerman, Peters and Dykman (1971) hypothesized that these children would make more errors than normals. They found that 67% of the learning disabled pupils (as compared to 44% of the controls) made more mistakes than average for children of equivalent ages. Billingslea (1963) reviewed the Bender Gestalt literature and concluded that it warranted administration in a battery aimed at differential diagnosis.

Larsen and Hammill (1975) reviewed research on the relationships between visual discrimination, spatial relations, memory, auditory-visual integration and school learning. They found little support for the hypothesis that many children fail in school because of visual-perceptual deficits. They note that a large percentage of children who do adequately on tests of visual perception have difficulty with school, and further that an equal percentage who do poorly on the same tests exhibit no difficulties in school.

Larsen, Rogers and Sowell (1976) have recently investigated the usefulness of the Illinois Test of Psycholinguistic Abilities, the Wepman Auditory Discrimination Test and the Bender in differentiating between normal and learning disabled children. They found the Bender to be the only instrument which successfully

differentiated the two groups, but they state that the difference, although statistically significant, was not large enough to warrant the planning of educational programs. They therefore give little support to the opinion that visual-motor skills are essential to academic achievement Though research relating academic success to visual-motor abilities is equivocal, the use of form copying measures is still typically employed in the test battery of psychologists seeking to identify learning disabled children. It thus remains to be determined whether or not visual-motor skills are truly central to academic success, and further, whether or not tests of these skills can differentiate between the learning disabled child and his successful counterpart to a degree that is educationally useful.

Non-Cognitive Predictors of Achievement

Self-Concept

As indicated in the previous discussion of intelligence tests, investigators have called for the inclusion of personality variables to increase the prediction of achievement. One such factor is self-concept. William James (1890) gave self-concept an integral role in his psychological thinking (Wylie, 1961). However, during the period from the 1920's to the 1940's, an era dominated by behaviorists and functionalists in American psychology, constructs such as the "self" received little attention. There was considerable theoretical writing on the subject, but little empirical work was conducted. Research resurged during the 1940's and 1950's. In education, goals had changed from a strictly cognitive emphasis to concern with

educating the 'whole child'. Increased consideration was granted to the social and affective components of the child and the relationship of these to his education.

The growth in the number of theories about self-concept may be attributed to a number of factors. The Freudian influence was becoming increasingly accepted, and at the time many American clinical psychologists were concluding that the behaviorists' model was too limiting for their practices. Though many of these theories were rather ambiguous or incomplete, they served to effect a change in the psychological approach to teaching. Then, with the 1957 launching of Sputnik, American educators reversed this change, and scrambled desparately to revamp their programs toward a more technological orientation. Once again the emphasis was placed upon cognitive academic outcomes (Bruner, 1960). Gradually however, the pendulum of opinion returned to a recognition of the affective needs of students and the role they play in school achievement. Accordingly, more and more researchers again became involved with the self-concept construct as an educational factor (Fink, 1962).

This variable also grew in importance because of its actual usefulness in predicting academic achievement (Brookover, 1962). This relationship to school success was expressed by Combs and Snygg (1959). They held that one's self-perception is acquired through interactions with significant others, including many persons in the school setting, who hold certain expectation of the learner. They emphasize that a positive

belief in one's ability to satisfy those expectations can be the determing factor in a student's willingness and capacity to learn.

The concept has recently been expanded, and may be viewed as a person's perception of himself, formed through his experiences with his environment, and influenced by environmental reinforcement and reinforcements from significant others (Shavelson, Hubner and Stanton, 1976). The attitudes and feelings that a person holds regarding himself influence how he behaves, which in turn influences how he sees himself (Fink, 1962). Alexander (1964) offers this description of the operation of the construct:

> ...self concept and achievement interact with mutual effect. That is, poor achievement leads to a depreciation of the self-concept which leads to a continued poor achievement, and to a lesser extent, good achievement leads to better achievement. One of the best defences that the poor achiever can use to escape this cycle is to devaluate or de-emphasize the academic situation so that achievement becomes unimportant to the maintenance of the self-concept. It is then possible for him to maintain an adequate self-esteem in spite of his poor performance in the school situation. (p.111)

Brookover, LaPere, Hamachek, Thomas and Erickson (1965) conducted an extensive study and found a positive relationship between self-concept and academic achievement. Findings

that measures of self-concept can predict achievement are supported by others such as Irwin (1967), Williams and Cole (1968), and Boersma, Chapman and Maguire, 1979).

Other studies report contrasting findings. Rubin and Sandidge (1977) found self-esteem to have a moderate but not strong effect on school achievement. By combining intelligence, socio-economic status and self-concept into a multiple regression equation, they found self-esteem to account for only 3% of the total variance. Other researchers who have found no significant relationship between self-concept and achievement include Borislow (1962), Badwal (1969) and Green (1971).

These conflicting results may be partially explained by the lack of concensus in the operational definitions employed (Kubiniec, 1970). There also seems to be a lack of reputable, standardized measures for all age levels. Couple these drawbacks with a lack of awareness on the part of educators concerning the possible importance of self-concept indices, and one arrives at conclusions such as that reached by Shavelson, Hubner and Stanton (1976) who state:

> Taken individually, they (self-concept studies , author's own insert) often provide important insights into factors that motivate students in and out of school and into alternative sources of action that may enhance students' self-concepts. However, considered as a body of research, self-concept studies lack the focus that would result from an agreed upon definition of self-concept, lack adequate validation of interpretations of self-concept

measures, and lack empirical data on the equivalence of the many self-concept measures currently being used. (p. 435)

Studies using self-concept as a predictor of academic achievement continue to develop because of clinical and educational impressions which confirm everyday observations. Fink (1962) maintains that an adequate self-concept is related to high achievement, and conversely, an inadequate self-concept is related to low achievement. Walsh (1956), and Bruch and Bodwin (1962) also suggest that low self-esteem may be significant in underachievement. Coopersmith (1959) concluded that, regardless of socio-economic status, one's self-esteem is related to his achievement level. If intellectual ability is partialled out, self-concept is a basic factor in determining school achievement (Williams and Cole, 1968).

Jones and Grienecks (1970) found self-concept to be effective in predicting scholarships at the high-school and college levels with equal or better predictive ability than measures of intellectual aptitude. Given the simplicity of using such measures, they suggest that educators attend "...to the self-perception of students at all levels." The schools should, in their opinion, seek to identify students with poor self-concepts, try to determine the causes, and attempt to remedy the situation.

In general, research supports the predictive value of self-theory, which maintains that one's behavior is affected by his perceptions of himself and his environment. Overall, self-esteem does seem related to academic achievement (Primevera, 1974). Kubiniec (1970) concludes that those trying to improve the predication of academic success should consider the use of such global predictors.

If self-concept and achievement do interact with mutual effect, then under-achievers as a group should have a lower self-concept than those who are successful (Shaw, 1961; Strang, 1968).

Gates (1941) observed that behavioral and emotional problems tend to increase with age amongst students experiencing learning problems. Black (1974) found in his research that elementary school learning disabled children with a reading deficit view themselves more negatively than do children with normal reading scores. Does the predictive relationship between self-concept and academic achievement transfer to learning disabled students? Leviton and Kiraly (1975) studied this question and their results indicate no direct positive relationship.

Because learning disabled children are characterized by under-achievement, one would expect such children to score lower than successful students on measures of academic self-concept. Shavelson et al. (1976) suggest that one consider, beyond the global self-concept, a division of the global construct into academic self-concept and non-academic self-concept. They further call for the academic scale to be

sub-divided into specific subject areas. The Student's Perception of Ability Scale (SPAS) developed by Chapman, Boersma and Maguire (1977), meets these suggestions for elementary school students, and has been employed in this study.

Locus of Control

Locus of control is a second personality construct which has received considerable attention in the predictive studies of academic achievement. The much publicized Coleman Report on the education of the disadvantaged children in America (Coleman, Campbell, Hobson, McPartland, Mood, Weinfield and York, 1966) gave considerable discussion to this variable, concluding that the degree to which one believes he has control over his future or fate is of central import educationally.

Rotter's (1954) locus of control construct had its roots in social learning theory. It describes the degree to which one believes that he or she is able to control the events of his life. The likelihood of a behavior occurring in a situation is a function of expectations that the behavior will be reinforced or not.

> As a general principle, internal control refers to the perception of positive and/or negative events as being a consequence of one's own actions and thereby under personal control; external control refers to the perception of positive and/or negative events as being unrelated to one's own behaviors in

certain situation and therefore beyond personal control. (Lefcourt, 1966, p. 207)

Simply then, locus of control may be viewed as the degree to which one accepts personal responsibility for his own reinforcement. Whether a student is markedly internal or external in orientation has important implications for his learning style and behavior. Students who are likely to assume responsibility for their actions as related to academic achievement should rate themselves as more internally oriented than students who perceive outside influences as determining their successes or failures. The degree to which a student believes he is responsible for his achievement can affect the effort he invests in it. A child who feels that success or failure is dependent upon his actions should actively pursue academic goals and show greater persistance in striving to realize them. Conversely, the externally oriented child feels that rewards and punishments are beyond his control and thus has little incentive to work under such a belief system (McGhee and Crandall, 1968). Students who are more highly internal should show better academic performance as they feel a responsibility for their successes and failures. Students who are more highly external may show weaker performances since they see little connection between their investment of time and energy and resultant outcomes.

A review of the literature on locus of control, reveals that many researchers have found a positive relationship between the internal-external (I-E) construct and academic achievement (Rotter, 1966; Lefourt, 1966; McGhee and Crandall, 1968).

Although the "internal" construct does appear to be positively related to achievement, it is only moderately related to intelligence (Gonzali, Cleary, Walster and Gonzali, 1973). It appears then that it is measuring something separate from cognitive ability.

Some investigators have not found this correlation between I-E and achievement, and suggest that no specific pattern emerges (Middleton and Guthrie, 1959). The consensus, however, seems to be that locus of control does have an effect on academic achievement, and further, that high achievement is associated with internality (Nord, 1974).

The I-E pattern does not appear to be fixed for children across ages. Locus of control seems to follow a developmental trend, with young children in general being more externally oriented than older children. Internality develops as the child matures and is better able to see the consequences and influences of his actions (Lawrence, 1969). Crandall, Katkovsky and Crandall (1965) found that self-responsibility is well established by third grade. With age and experience, most children tend to view their personal actions as being instrumental is determining subsequent reinforcement.

What then is the expected relationship between locus of control and school achievement for the learning disabled student? Given that academic success normally requires a modicum of energy and persistence, and that externals tend to see little relationship between their efforts and learning outcomes,

it would seem that such students are caught in a vulnerable position. Kifer (1975) indicates that I-E scores differentiate quite clearly between successful and unsuccessful students. The former tend to be internal and become more so with increased age. Unsuccessful students however, tend to remain relatively external with age, suggesting that the expected developmental trend is slowed in learning disabled students. If learning disabled children do not recognize the relationship between their efforts and reinforcements, it follows that they can become trapped in a pattern of diminishing successes, and find themselves further and further removed from motivating experiences. Repeated failures would establish the external orientation of the learning disabled student. Chapman and Boersma (1979) found learning disabled children to be more external in their perceptions regarding success in school related performance. It seems plausible that such students would develop strongly generalized negative attitudes about their academic competencies and about themselves (Ames and Felker, 1978; Boersma, Chapman & Maguire, 1979). Negative self-perceptions then come to be associated with an external viewpoint.

Teacher Rating Scales

In assessing children, a relatively new approach is the teacher rating scale that allows the teacher to evaluate various student behaviors in a checklist format.

A child's behavior changes in differing situations. His

interaction while playing with friends is different from his behavior with parents, and from behavior at school with his teachers and peers. The teacher shares a large part of the student's day, and becomes aware of his strengths and weaknesses, his preferences, how he relates to his classmates, his personality characteristics, his needs and his achievement. The teacher is in a position to observe a child's reactions in a variety of school situations. Although, perhaps, unable to measure precisely the student's capacities and characteristics, the teacher can offer a fairly accurate global picture of the functioning of a child after three or four months of contact. Teachers have the advantage of being able to compare a student with others of the same age in a similar environment, in a way unavailable to most parents and psychologists (Warburton, 1961).

When a child is experiencing difficulties in school, the teacher typically refers the child to see a school counsellor. It is the classroom teacher then who has the initial responsibility of identifying a problem and requesting referral. This is appropriate given the close and continuous contact the teacher has with the student.

After a student has been referred, the counsellor will likely begin to collect background information prior to actually seeing the student. This may include information found in the student's cumulative record folder, discussions with previous teachers, classroom observations, possibly discussion with parents, and often some form of teacher rating scale.

Researchers who attempt to identify students experiencing learning difficulties have stressed the use of teacher rating scales (Keogh, Tchir and Windeguth, 1972). These scales tap areas of immediate concern to the professionals involved, and yield an efficient and fairly accurate picture of the student in various aspects. Studies have shown teachers to be fairly effective in distinguishing between high risk and low risk children, that is, in identifying children likely to experience behavior or learning difficulties in the future. The successful prediction of high risk students has been aided by the construction of standardized checklists such as the Pupil Rating Scale (Myklebust, 1971).

Many investigators have found positive correlations between teacher's ratings and achievement (Ilg, Ames and Appel, 1965; Spivack, Swift and Prewitt,1971; Keogh and Tchir, 1972). Kermonian (1962) conducted a study to determine the reliability of teacher assessments regarding the readiness of children to enter grade one. Results indicated that these assessments correlated significantly with scores on the Metropolitan Readiness Test. Haring and Ridgeway (1967) asked teachers to select one quarter of their students who they thought to be a high risk. Results revealed a quite accurate selection of children with developmental lags. In a similar study (Ferinden, Jacobsen and Linden, 1970), teachers selected kindergarten students who they considered to be high risk

for grade one success. Teachers were 80% effective in predicting potential learning problems. Koegh and Smith (1970) followed a group of kindergarten children through to fifth grade and found a consistent relationship between teacher ratings at the kindergarten level and subsequent school achievement. Chang (1976) used fourth through sixth grade students to determine the relationship between children's self-concept, academic achievement and the teacher's rating of the children's self-concept. Significant correlations were found between the teacher's rating of the child's self-concept and the child's own rating, and between the teacher's rating and academic achievement. This suggests that the teacher can provide reliable information on her students if requested to do so.

These studies seem to suggest that teacher ratings of children can play an important role in the identification of potentially learning disabled students, because observations are made in an educational environment on a child faced with educational tasks. Large numbers of children can be screened in a relatively short period of time, and the results are likely to be educationally relevant (Ohlson, 1978).

Chapter 3

Method

This chapter outlines the measures and procedures used in this research study. The chapter begins with information on the subjects who participated in the study. This is followed by a discussion of the procedures and the various instruments used. The instruments are described and reasons for their inclusion are offered. The final section deals with the method of data analysis.

Subjects

All of the 10 division II classes of Brentwood Elementary School, County of Strathcona No. 20, participated in the study. There were three classes of each grade from four to six, and one full time learning disability class. This school is representative of schools in the County of Strathcona and many other urban communities. It is typically middle class, including families of blue collar and service workers, and some professionals. The results of this study should generalize to similar populations.

The initial population had 252 students in it, but 13 students either moved or transferred out of the school before the year-end data could be collected, and three subjects were eliminated from the analysis due to incomplete data. Of the 236 included, 122 were boys and 114 were girls.

Brentwood School has a number of 'special services' programs operating in the school - such as a remedial reading program, a language therapy program, a part-time learning assistance program, and a full time learning assistance program. The part-time learning assistance program offers assistance to a learning disabled child

in his area of difficulty for approximately one-half hour each day. The full time learning assistance class is a self-contained class of 10 students. The students here have been identified as more severely disabled. The learning disabled students used in this project were identified in accordance with the County's definition of learning disabilities. They were selected from both the part-time and the full-time learning assistance classes.

Research was conducted in early December (1977) to allow the teachers adequate time to become familiar with their students and thus able to complete the A-M-L Behavior Rating Scale. Also, this is an interval in the school calendar between testing-reporting periods, and far enough in advance of a major holiday that 'holiday heart' is not a contaminating factor.

Procedure

The investigation was conducted with the 239 division II elementary school students. The instruments composing the battery were administered in two sessions per classroom by the investigator during regular classroom hours. The measures were presented so that each of the two testing sessions took approximately 45 to 50 minutes of classroom time. The exception to this procedure was with the grade four classes who were requested to spend two additional one hour sessions completing the Lorge Thorndike Intelligence Test. The Lorge Thorndike is administered in grade five, so scores were available from this test for the grade five and six students from their cumulative records. It was necessary to have the grade four students complete this

instrument to have an equivalent measure of intelligence for all subjects. Thus, four instruments were administered by the investigator (Wide Range Achievement Test, Academic Achievement Accountability (AAA) Scale, Student's Perception of Ability Scale (SPAS), Beery Developmental Test of Visual Motor Integration (VMI) to all division II students, and the additional I.Q. test to the grade four students. The homeroom teachers of each class were requested to complete an A-M-L Behavior Rating Scale on each pupil in their class. Informal sessions were held with teachers to explain the method used in completing the rating scales, and to counteract the possibility of an 'halo effect'. This is a tendency when judging people, to be influenced by either their strong or weak points, and to allow those considerations to influence the rating by either overrating or underrating the characteristics being tapped (Sattler, 1974). A teacher may overlook a student's interest in sports or his social interaction skills if he is a poor student, or conversely, allow the personal charm of another student to influence the overall rating. The scales were completed by the teachers without their knowledge of the performance of students on the measures being used.

The instruments which required the student to read to complete a question were read aloud by the examiner to the students at all grade levels so they would not be penalized by poor reading skills. Similarly, extended time limits were allowed on items requiring motor responses.

The Canadian Test of Basic Skills was administered in May, 1978 as part of the school systems standardized testing program. It was administered by the classroom teacher, and computer scored. Results return to the schools early in June of each year.

Measuring Instruments

The tests administered in this study were chosen for a number of reasons. First, four of the measures are commonly used in most local school districts to assess referred children. Second, the literature on predictors of school achievement suggests that consideration be given to noncognitive or personality constructs. Such measures were included in the study based upon theoretical and empirical support. A final consideration in the selection process was administration time or efficiency. It was desired that the instruments be group administered; that the scoring system be objective; and that they satisfy adequate reliability and validity requirements.

Lorge Thorndike Intelligence Test (Lorge and Thorndike, 1954)

This test consists of a Verbal and Nonverbal Battery with specific items for each grade level. The Verbal Battery consists of five subtests: Vocabulary, Verbal Classification, Sentence Completion, Arithmetic Reasoning, and Verbal Analogy. The Nonverbal Battery uses either pictoral or numerical items and is composed of three subtests: Pictoral Classification, Pictoral Analogy and Numerical Relationships. The odd-even reliability of the tests for the grade four level is as follows:

Level	Grade	N	Verbal Battery	Nonverbal Battery
B	4	549	r .930	r .930

(Manual for Administration, 1967, p. 29)

The validity is established by correlations with other tests designed to measure the same thing. Correlations of the Verbal Scale with the WISC Verbal Scale and the Stanford-Binet are reported "in the high seventies and low eighties". The Nonverbal Scale correlated with the same tests in the high "sixties and low seventies" (Canadian Lorge Thorndike Intelligence Test Manual for Administration, 1967, p. 29). The Canadian Lorge Thorndike Tests were standardized in 1966 as part of an integrated program with the Canadian Test of Basic Skills (CTBS) in grades three to eight. Participants in the program were Canadian schools with a sample base of 4,500 pupils per grade level.

Historically, some index of achievement has usually been related to academic achievement (Cattell, Sealy and Sweny, 1966). This particular scale was used in the investigation since it is the group administered test used throughout the school system, and therefore readily accessible on cumulative records.

Canadian Test of Basic Skills (CTBS)

The CTBS is an achievement test with 11 subtests which yield six composite subtotal scores. The areas assessed are: vocabulary, language skills, reading comprehension, work study skills, and mathematics. In describing the test battery the

authors (Hieronymus and King eds., 1975) state: "The Canadian Test of Basic Skills differ from most other elementary achievement test batteries in that they are concerned only with generalized intellectual skills and abilities and do not provide separate measures of achievement in the content subjects, such as the social studies, literature, general science, and descriptive geography" (p. 6). The split-half reliability coefficient for the grade levels are as follows:

	Vocabulary	Reading	Language	Work Study Skills	Math	Composite
Grade 4	.88	.92	.95	.91	.90	.98
Grade 5	.89	.93	.96	.93	.88	.98
Grade 6	.86	.93	.95	.91	.91	.98

(Manual for Administrators, Supervisors and Counsellor, Forms 3 & 4, p.52)

In discussing the validity of the CTBS, the editors (Hieronymus and King, 1975) adopt Cronbach's (1970) position that "validation is the task of the test interpreter". The tests are constructed to correspond to a diverse array of instructional objectives across the country, so it is difficult for it to meet the needs of every school's curriculum. The editors therefore suggest that those selecting the achievement test 'take' the test to decide the relationships of the test to local curricular objectives. The test does not appear to have been correlated with other measures for validation as the editors state such a procedure be followed "... only if the other measures are admittedly better than the test that is being evaluated" (p. 40). A lack of equivalent

measures of Canadian origin could be the reason for the lack of such validation procedures.

As mentioned previously, the CTBS was standardized concurrently with the Lorge Thorndike on a Canadian population in 1966. It was included in this study since it is an accepted and established index of academic achievement.

The Wide Range Achievement Test (WRAT)

The WRAT consists of three subtests which measure achievement in reading, spelling and arithmetic. The reading subtest however was eliminated for the purposes of this study since it must be administered individually. The spelling subtest consists of writing 45 single words to dictation. The arithmetic subtest consists of 53 items of increasing difficulty. Once scored, the results provide a grade equivalent, a standard score, a percentile rank and a stanine for each subtest score. The reliability of the WRAT subtests has been studied for numerous populations of different degrees of homogeneity for the past 20 years. The correlation coefficients range from .92 to .98 for the reading and spelling subtests and from .85 to .92 for the arithmetic subtests. The authors further add that they feel the clinical reliability of the WRAT to be in the area of .90 to .95, with an average reliability of .93. Several methods of estimating the validity of the WRAT have been employed. They are (1) the correlation of test results with outside criteria such as teachers' ratings, (2) the correlation with the scores of

other achievement tests, (3) the correlation of the achievement scores with mental ability or intelligence ratings, (4) factor analysis of a large number of abilities to determine the factor loadings on each subtest (Jastak and Jastak, 1978, p. 49). Wagner (cited in Jastak and Jastak, 1978) compared the WRAT reading test scores of grade five students with teacher ratings of their achievement and found a correlation of .78. The same performance correlated .88 with mid-term grades. Wagner and McCloy (cited in Jastak and Jastak, 1978) further compared the WRAT reading subtest with the Woody-Sangren Silent Reading Test and the New Standford Reading Test and arrived at coefficients of +.78 and +.80 respectively. Using internal consistency for validation of the subtests, the inter-correlations between the two WRAT scales used are as follows:

Age	Spelling vs. Arithmetic
8	.70
9	.73
10	.76
11	.76

(Jastak and Jastak, 1978, p. 51)

The WRAT was first standardized in 1936 for the study of basic school subjects. It has been restandardized four times, most recently in 1978. The WRAT was included in this study since it is widely used by psychologists and counsellors in the Province of Alberta to assess achievement. Furthermore, its use

is recommended in the identification of learning disabled children in the County of Strathcona. A copy of the WRAT can be found in Appendix A.

The Beery Developmental Test of Visual-Motor Integration (VMI)

Perceptual-motor development is typically assessed with a form copying test such as the Bender-Gestalt Test for Young Children (Koppitz, 1963). The drawbacks of the Bender, however, are the time-consuming administration and interpretation, and the lack of a rigorous and standardized scoring system. The Beery VMI (1967) is a convenient alternative which consists of 24 designs arranged sequentially by level of difficulty. The child is instructed to copy the forms without erasing, tilting the booklet or re-working a design. Scoring criteria are detailed and illustrated, and age-equivalent norms based upon the total raw score are presented for both sexes within the age range of two years ten months to 15 years nine months. Pryzwansky (1978) finds that individual or group administrations yield comparable scores. Ryckman and Rentfrow (1971) find the VMI to possess sufficient reliability to be useful with elementary school children. They report test-retest correlations on children of second, fourth and sixth grade of .62 to .84. A copy of the VMI can be found in Appendix B.

A-M-L Behavior Rating Scale

The A-M-L Rating Scale is an 11 item screening device for identifying children with learning or behavior problems. The scale helps the teacher record various kinds of behavior in one

of three areas. The frequency with which these behaviors occur is checked on a five point scale. The five odd numbered items comprise subscale A (aggressive, outgoing behavior). The five even numbered items comprise subscale M (moody, withdrawn, internalized behavior). Item eleven comprises subscale L (degree of learning difficulty). The range in total A-M-L score is 11-55 points, with lower scores indicating more acceptable behavior. Subscale scores can also be derived for A, M, and L. It is recommended that the teacher have the pupils for a minimum of three months prior to completing the scale. The 11 items of the A-M-L were derived by factor analysis from two existing behavior rating scales. The scales were used by 120 classroom teachers in 38 schools in 12 school districts, kindergarten through grade five. In many classrooms one or more children came from multiproblem families. One hundred children of these children were selected as were one hundred to serve as a control. Eighty percent of the multiproblem families were identified by teachers rating their children on the items included in the two scales. The Kuder-Richardson 21 reliability formula when applied to the total population of 2,872 showed an r of .74 for one scale and .92 for the other. A factor analysis of the two scales resulted in three factors: A, M, and L. The most significantly differentiating items comprise the A-M-L Behavior Rating Scale. The scale has not previously been used as a predictive scale. It was included in the study to determine whether it was beneficial in improving early identification procedures (Johnson, 1976). See Appendix C.

Academic Achievement Accountability (AAA) Scale (Clifford and Cleary, 1972)

The AAA measures locus of control regarding academic outcomes. It consists of 18 questions pertaining to academic activities. Each question calls for a "yes" or "no" response, and a five point scale is provided to assess the strength of the reply. It can be group administered in 15 to 20 minutes. It is recommended that the administrator be someone other than the regular teacher, and that the administrator read the questions aloud to the students. The score range is 18-90. A high score indicates acceptance of responsibility for academic outcomes. The scale was administered to more than 1,000 students in grades three to eight. The Kuder-Richardson formula 20 ranged from .63 to .85 with the median .74. The correlations between Composite Grade Equivalency on Iowa Tests of Basic Skills and the AAA are in the .30s and significant beyond the .05 or .01 level. Means and standard deviations are relatively stable across grades, averaging approximately 75.0 and 9.0 respectively (Johnson, 1976).

Researchers studying locus of control and school achievement have typically used the Intellectual Achievement Responsibilities (IAR) scale (Crandall, Katkovsky and Crandall, 1965). Clifford and Cleary's 1972 AAA scale purports to measure a similar construct, but has some important differences. It requires 80% less reading than the IAR; it attributes the source of external control to "significant others" rather than to parents, friends or teachers; and it dichotomizes between self-accountability and no accountability whereas the IAR distinguishes only between

self and others as causal factors (Clifford and Cleary, 1972). For these reasons the AAA appears to be a preferable instrument. The AAA can be found in Appendix D.

Student's Perception of Ability Scale (SPAS)

The SPAS measures academic self-confidence in elementary school children. It consists of 70 "yes" or "no" questions which comprise the six subscales: general ability, arithmetic, reading and spelling, school satisfaction, penmanship and neatness, and confidence. It can be group administered in about 20 minutes. The SPAS was normed on approximately 1,800 elementary school children in Alberta. Estimates of internal consistency using Cronbach's alpha yielded a full scale alpha of .92. The test-retest reliability over a four to six week interval was .83. Correlations with the Piers-Harris Children's Self Concept Scale (1969) ranged from -.03 to .08 indicating that academic self-concept is distinguishable from general self-concept. The authors report that the ability of the SPAS to identify students with learning problems suggests good experimental validity for the SPAS. The SPAS correlation of .49 with grade point average indicated that it is a moderate predictor of school success. Further information on the SPAS may be found in Appendix E.

Data Analysis

The data was analyzed using a step-wise multiple regression analysis and a Hotelling T^2 analysis. A regression analysis was conducted using the CTBS results as the criterion variable to determine how well the psychoeducational instruments used in this research predicted academic achievement. A second step-wise regression analysis was conducted using group membership (control "normal" or learning disabled) as the criterion. Hotelling T^2 was used as a more rigorous test to determine how the independent variables, taken singly or in combination differentiate the learning disabled from the control subjects. The Hotelling T^2 was conducted with 25 students randomly selected from the control group and compared with the learning disabled group. Each variable was examined for differences between the two groups.

Table 1

Summary of Measures Used

Area	Name of Test	Variable and Description
Cognition	Lorge-Thorndike	Nonverbal and verbal intelligence
Achievement	Canadian Test of Basic Skills (CTBS)	Elementary achievement test battery with 11 subtests which yield six subtotal scores in the areas of: vocabulary, language, reading comprehension, work-study skills, and mathematics
Achievement	Wide Range Achievement Test (WRAT)	Psychoeducational achievement test yielding scores in arithmetic, spelling and reading
Sensory-Perception and Motor Skills	Beery Developmental Test of Visual Motor Integration (VMI)	Form copying test of 24 designs arranged sequentially by level of difficulty.
Personality and Emotionality	A-M-L Behavior Rating Scale (AML)	Teacher rating scale assessing classroom behavior and learning symptoms. The scales are: aggresson, moodiness and learning difficulty.
Self-Concept	Academic Achievement Accountability Scale (AAA)	Locus-of-control regarding academic outcomes
Self-Concept	Student's Perception of Ability Scale (SPAS)	Academic self-concept at elementary level. 70 yes/no items with 6 subscales: general ability, arithmetic, reading, spelling, school satisfaction, penmanship and neatness, and confidence.

Chapter 4

Results

This chapter summarizes the results of the various analyses used in the research investigation. The chapter begins with a discussion of the descriptive statistics which summarize the differences in the scores of the learning disabled and the control groups on all predictor variables. The average score on each of the variables for each group is summarized in Table 2. Table 6 shows the correlation matrix for all variables in the study and may be found in Appendix F. The second part of the chapter summarizes the multiple regression analyses used in predicting the criterion variables of CTBS score or group membership. The final section of the chapter discusses which groups of variables differentiate the two groups, and reports the results of Hotelling's T^2.

Descriptive Statistics

Table 2 presents a summary of the results for the predictor variables: means and standard deviations for the learning disabled group, the control group, and the total group taken collectively. The trend observed from this data is that the differences between means (without regard to statistical significance) are in agreement with predictions. On many of the variables a high score suggests academic success, and it is expected that members of the control group would score better. On other measures, a high score indicates some learning difficulties, and the learning disabled students tend to score higher. Scores on variables such as achievement (Wide Range

TABLE 2

Means and Standard Deviations on all Variables

Variable	Learning Disabled $\bar{X}$. LD	std. deviation LD	Control Group $\bar{X}$. controls	std. deviation controls	Total Group $\bar{X}$.	std. deviation
IQ	97.24	7.61	108.39	12.27	107.21	12.38
VMI	16.68	2.38	17.45	2.73	17.36	2.71
A of A-M-L	7.96	3.54	8.02	3.25	8.02	3.29
M of A-M-L	8.64	3.70	7.93	3.02	8.00	3.12
L of A-M-L	3.60	0.75	2.04	0.97	2.21	1.06
A-M-L Total	20.20	6.79	17.97	5.99	18.20	6.13
AAA (locus of control)	65.32	12.16	72.89	8.68	72.08	9.43
WRAT Spelling	40.16	6.14	47.37	5.59	46.61	6.08
WRAT Arith.	31.04	3.17	33.69	3.16	33.41	3.28
CTBS Vocab.	21.32	8.36	27.88	6.87	27.19	7.34
CTBS Rdg. Comp.	30.32	11.03	42.63	12.26	41.32	12.74
CTBS Lang.	56.84	15.90	90.50	23.18	86.94	24.84
CTBS Work study skills	46.08	14.98	64.38	18.54	62.44	19.09
CTBS Math.	26.08	8.85	40.24	11.74	38.74	12.30
CTBS Total	180.64	46.42	265.73	64.10	256.72	67.87
SPAS General Ability	7.04	2.51	7.68	2.82	7.61	2.80
SPAS Arith.	8.32	2.98	9.44	2.89	9.32	2.93
SPAS School Satisfaction	6.04	2.99	7.65	2.73	7.45	2.84
SPAS Reading/ Spelling	6.88	3.06	8.51	3.11	8.26	3.22
SPAS Penmanship/ Neatness	6.36	3.12	7.45	3.02	7.31	3.08
SPAS Confidence	3.61	1.93	3.50	1.86	3.38	1.95
SPAS Full scale	37.96	11.02	43.97	11.54	43.33	11.66

Note Learning disabled n = 25
Control group n = 211
Total group n = 236

Achievement Test spelling, Canadian Tests of Basic Skills total), locus of control (Academic Achievement Accountability Scale), intelligence (Lorge-Thorndike), and self-concept (Students Perception of Ability Scale) do appear higher for the control group. Similarly, the A-M-L scores, where a high score indicates teacher concern with pupil behavior, differ with the learning disabled group scoring higher. An interesting exception, however, is on the Student's Perception of Ability Scale, confidence subscale where the learning disabled group scores are larger. This contradicts the expectation that learning disabled children would demonstrate less academic confidence (Black, 1974).

Given that a learning disabled child is defined as having average intelligence or better, one would expect intelligence scores to be very similar. While both groups are within the average range, the control group scored 11 points higher. Possibly this is due to the nature of the Lorge-Thorndike Intelligence Test which is a paper and pencil instrument. The verbal battery requires the examinee to read the items and learning disabled children may be penalized by this approach.

Multiple Regression Analyses

Multiple regression is used to make multiple predictions on the criterion variable. The purpose of multiple regression in this investigation was to determine which combinations of instruments are the best predictors of (a) achievement as

measured by the Canadian Tests of Basics Skills, and (b) group membership. Multiple regression analysis yields optimal weights that maximize the correlation between the criterion variable and the predictor variables.

The results of the step-wise regression analysis are presented in Tables 3 and 4. Table 3 summarizes the regression analysis for the combined group using the Canadian Tests of Basic Skills (total score) as the criterion variable. Table 4 includes the Canadian Tests of Basic Skills (subscale scores) as predictors and uses group membership as the criterion variable.

Studies involving the prediction of academic success have commonly used student achievement as the index. Achievement is a central consideration in determining whether or not a student is learning disabled. In this research single variables or some number of variables combined, are analyzed to determine how well they predict student achievement. The Canadian Tests of Basic Skills is used as the criterion variable in this phase of the study since it is an objective and comprehensive, well established, and widely recognized instrument.

Table 3 summarizes the predictor variables which entered the regression analysis with α.99. The best predictor of the Canadian Tests of Basic Skills total score is 'L' of the A-M-L Behavior Rating Scale. 'L' is a single item representing the classroom teacher's estimate of the child's learning ability. The teacher responds to the stem "Has difficulty learning" by checking a five point scale which ranges from "Seldom or never"

to "All of the time". This subscale allows one to predict about 51% of the variability of the Canadian Tests of Basic Skills total score. Apparently teachers are fairly accurate in their perception of a student's learning ability. They can discriminate among their pupils and their estimate is a good predictor of achievement. These results lend support to previous investigations such as those conducted by Chang (1976) and Bonifero (1975).

Nevertheless, the 'L' scale is only a single item and as such is vulnerable to a number of possible problems. The stem "Has difficulty learning" may be interpreted in various ways. It is a global type of question with no qualifiers. A responding teacher may consider (or not consider) a student's intelligence, motivation, achievement, or specific subject areas or circumstances when replying. Such an open-ended item may lack the power of a set of more specific questions, but it is still useful as a predictive measure.

The next three variables to enter the regression analysis are all cognitive measures and together account for an additional 22% of the variance in achievement. The two Wide Range Achievement Test subscales, if considered together, account for nearly 16% of the variance. This is expected, given that the Wide Range Achievement Test is also an index like the CTBS. Intelligence adds almost 7% of the variance to this constellation of measures. These three factors (two WRAT subscales and IQ) are all intellectual in nature, the significant correlation with academic achievement is to be expected.

Of the remaining six variables to enter the regression analysis, all but one (the Beery VMI) can be considered non-intellectual or personality variables. These six measures contribute only an additional 5.6% to the total variance. It would appear that in terms of predicting the Canadian Tests of Basic Skills Total Score, the Beery VMI makes

TABLE 3

Multiple Regression with Canadian Tests of Basic Skills (CTBS)

Total as Criterion, α 0.99

Step No.	Variable	F Value	P Level	% Variance Accounted for	% Variance Added
1	L of A-M-L*	248.52	< 0.001	51.19	-
2	WRAT Arith.*	89.91	< 0.001	64.10	12.92
3	IQ*	53.26	< 0.001	70.73	6.63
4	WRAT Spell.*	25.93	< 0.001	73.65	2.92
5	A-M-L Total*	13.19	< 0.001	75.06	1.41
6	SPAS Total*	8.78	< 0.001	75.97	0.91
7	VMI	2.61	0.107	76.24	0.27
8	AAA	2.30	0.131	76.48	0.24
9	M of A-M-L	0.66	0.418	76.54	0.07
10	A of A-M-L	29.74	< 0.001	79.25	3.71

Note: n = 236

* denotes those variables significant at α = .05

No further steps entered after step No. 10 with α 0.99

little contribution. Of the five personality indices, only the A-M-L total and the Student's Perception of Ability Scale Total are significant at p .05. Considering the expectations generated by a review of the literature, it is surprising that these personality variables do not appear as more significant. Possibly their effect is dim diminished by the large portion of the variance accounted for by the 'L' scale. Nevertheless, it would seem that academic achievement is not greatly influenced by such noncognitive measures as these.

Predicting Group Membership

The central focus of this investigation is to determine which psychoeducational tests, or which combination of them, are most effective in discriminating between the learning disabled and the "normal" students. Table 4 presented a summary of the predictors, including the Canadian Tests of Basic Skills subscales, using group membership in either the control group or the learning disabled group as the criterion variable.

The 'L' of the A-M-L Behavior Rating Scale is the most powerful measure in terms of predicting group membership. Teachers not only seem to be good at predicting academic achievement, they also appear to be effective at identifying learning disabled students. They rate children according to what is present and observable in the classroom. They know if pupils are having difficulty achieving, and the 'L' scale is a reflection of actual academic behavior.

Another significant cognitive measure, the Canadian Tests of Basic Skills Language subscale, entered fourth in the regression analysis. Language skills do differentiate the two

TABLE 4

Multiple Step-wise Regression Predicting Group Membership, α 0.95

Step No.	Variable	F Value	P Level	% Variance Accounted for	% Variance Added
1	L of A-M-L*	60.23	< 0.001	20.47	-
2	AAA*	7.09	0.008	22.82	2.35
3	SPAS Confidence*	6.09	0.014	24.79	1.98
4	CTBS Language*	5.88	0.016	26.66	1.87
5	A of A-M-L*	7.08	0.008	28.85	2.19
6	SPAS Penmanship/Neatness	2.34	0.128	29.57	0.72
7	WRAT Spelling	1.81	0.180	30.12	0.56
8	SPAS Rdg./ Spelling	2.69	0.102	30.94	0.82
9	SPAS School Satisfaction	0.78	0.377	31.18	0.24
10	IQ	0.88	0.350	31.45	0.27
11	CTBS Math.	1.21	0.272	31.82	0.37
12	CTBS Work Study Skills	1.19	0.277	32.18	0.36
13	CTBS Vocab.	0.58	0.447	32.35	0.18
14	CTBS Total	1.55	0.215	32.83	0.47
15	CTBS Reading Comp.	1.72	0.191	33.35	0.52
16	SPAS Full Scale	0.20	0.659	33.41	0.06
17	A-M-L Total	0.22	0.639	33.47	0.07
18	M of A-M-L	6.29	0.013	35.35	1.87
19	WRAT Arith.	0.24	0.626	35.42	0.07
20	SPAS General Ability	0.01	0.916	35.42	0.01

Note: N = 236, p = .05

* denotes variables significant at α = .05

no further steps entered beyong step No. 20 with α 0.95

populations to a degree. Impaired language ability is one of the most prevalent conditions found in the learning disabled (McGrady, 1968).

The remaining variables contributing significantly to the regression are all non-intellectual factors. Scores on the Academic Achievement Accountability Scale (a locus of control measure) show that the learning disabled students are more external than the control group. The Confidence subscale of the Student's Perception of Ability Scale also discriminates between the two groups, but surprisingly, it is the learning disabled sample that scores somewhat higher. If SPAS does measure academic self-confidence, it also seems reasonable to predict that high scores on self-confidence would be internally controlled. These apparent contradictions may be the result of special conditions in the learning assistance classes from which the learning disabled sample was drawn. It is possible that the "confidence" observed here is in fact externally produced. Perhaps the relationship between self-confidence, locus of control, and self-concept is more complicated than has been assumed here.

There are two additional measures which belong to this non-intellectual collection of predictors, the 'A' and the 'M' of the 'A-M-L' scale, which account for about 2% of the variance in group membership. The "A" subscale expresses aggression; the "M" moodiness. The group of four non-cognitive measures contribute a combined variance of almost 9% to the total variance.

It would seem then that a child's membership in either group is primarily a function of how his teacher perceives him, combined with his non-intellectual orientation towards his schoolwork. How a student approaches his academic problems then must be considered in addition to his intellectual abilities. Academic measures, with the exception of the Canadian Tests of Basic Skills Language subtest appear to contribute little towards the prediction of group membership. This may be partially accounted for by predominance of the 'L' of 'A-M-L' ratings. The teacher, when completing this scale, probably considers a number of intellectual components in arriving at a rating. These considerations ultimately overshadow the results of more formal assessment.

Since teacher ratings and non-intellectual personality factors account for only 35% of the variance in group membership, with 65% left unaccounted for, it does not seem useful to administer this battery of tests. It could be that the measures used here are simply not sensitive enough for the identification of learning disabled children, or it may be that the "learning disabled" population in this study does not actually conform to the definitions that have been assumed. It is also possible that the methodology employed in this investigation ignores the heterogeneous character of the learning disabled group. Discussion of these considerations will be found in Chapter 5.

Hotelling T^2 Analysis

When comparing the difference between means of two groups on a single variable, one could employ a t test. However, when more than one variable is used, a more rigorous test is the Hotelling T^2 statistic. This procedure compares the differences between all means simultaneously using the covariance among the variables to refine the overall relationship between groups. Results of this analysis are presented in Table 5.

On the basis of the 22 variables included in this investigation, considered simultaneously, the Hotelling T^2 indicates a significant overall difference between the two groups ($p < .01$). Individual comparisons on the 22 variables show that some group differences stand out ($p < .01$). They seem to be the most important factors for distinguishing between the controls and the learning disabled sample. These measures include 'L' of the 'A-M-L' scale, Canadian Tests of Basic Skills Language, and the Canadian Tests of Basic Skills total score. Other differences, significant at the $p < .10$ level, are CTBS reading comprehension and CTBS mathematics subtests. The five variables just mentioned are cognitive in nature and achievement oriented. Somewhat less notable differences ($.10 < p < .30$) are those found on the Wide Range Achievement Test Spelling, intelligence (Lorge-Thorndike), and CTBS Work Study Skills. The remaining variables, VMI, AAA (locus of control), WRAT Arithmetic, CTBS Vocabulary, 'A' and 'M' of the 'A-M-L' scale as well as 'A-M-L' Total, and the SPAS, do not appear to discriminate between the two groups

TABLE 5

Hotelling T^2 - Comparison between Learning Disabled and Control Groups

Variable	$\bar{X}$. LD's	$\bar{X}$. Controls	T^2	F	P Level
1. IQ	97.24	109.04	20.63	1.485	0.18
2. VMI	16.68	17.92	3.45	0.248	0.99
3. AAA	65.32	75.40	11.55	0.831	0.61
4. WRAT Spelling	40.16	48.36	23.17	1.668	0.12
5. WRAT Arith.	31.04	33.16	5.73	0.413	0.94
6. CTBS Vocab.	21.32	28.88	12.51	0.900	0.55
7. CTBS Rdg. Comp.	30.32	45.64	24.77	1.783	0.09
8. CTBS Lang.	56.84	93.12	54.14	3.897	<0.01
9. CTBS Work Study Skills	46.08	66.92	17.51	1.261	0.28
10. CTBS Math.	26.08	40.08	24.349	1.752	<0.09
11. CTBS Total	180.64	274.64	38.03	2.737	0.01
Variables 1 - 11			77.35	5.567	<0.01
12. A	7.96	7.56	0.21	0.015	1.00
13. M	8.64	7.72	0.96	0.069	0.99
14. L	3.60	1.76	71.13	5.119	<0.01
15. A-M-L Total	20.20	17.04	3.62	0.260	0.99
16. SPAS General Ability	7.04	8.08	1.85	0.133	0.99
17. SPAS Arith.	8.32	9.72	2.77	0.199	0.99
18. SPAS School Satisfaction	6.04	8.24	8.41	0.605	0.81
19. SPAS Rdg./ Spelling	6.88	9.00	5.56	0.400	0.95
20. SPAS Penmanship/Neatness	6.36	7.92	3.636	0.262	0.99
21. SPAS Confidence	3.32	3.92	1.003	0.072	0.99
22. SPAS Full Scale	37.96	46.88	7.668	0.552	0.85
Variables 12 - 22			60.967	4.388	<0.01

to a significant degree. No major differences are apparent on any of the personality measures.

In reviewing all of the analyses, the 'L' subscale of the 'A-M-L' is a consistently important measure. In the regression analyses cognitive variables appear to account for the greatest amount of the variance, but affective variables do enter and contribute. This is not the case, however, when examining mean differences on all the variables between the two groups. The Hotelling's T^2 analysis reveals that the variables showing statistically significant discrimination tend to be achievement oriented. The CTBS Language and the CTBS Reading focus on special areas of difficulty for learning disabled children. These skills are essential to success in a school environment.

The definition of a learning disabled child used in the County of Strathcona includes an achievement discrepancy clause. These test results show this discrepancy and confirm this particular definition.

Nevertheless, the fact that clear differences exist between the learning disabled group and the controls must be reconciled with the fact that prediction of group membership from the multiple regression analyses was less than ideal. This discrepancy will be discussed in Chapter 5.

Chapter 5

Discussion, Conclusions and Recommendations

This study has investigated two areas: the use of certain psychoeducational measures in the prediction of elementary school achievement; and the prediction of group membership in either a learning disabled or a control group. The central purpose of the study was to determine which measures commonly employed by school specialists (counsellors and psychologists) serve as the most reliable predictors or indicators of learning disabled children.

Results from the present study reveal that the battery used serves as a reasonably good predictor of school achievement. The same conclusion however, cannot be drawn with respect to predicting learning disabilities. Though significant differences were found between the learning disabled and control groups on certain academic measures, a multiple regression analysis indicated that this battery was not a powerful predictor for the learning disabled population.

The remainder of this chapter is divided into three parts. The first section is devoted to a discussion of the results, conclusions and implications; the second offers recommendations arising from the study; and the third deals with further research.

Discussion, Conclusions and Implications

The major conclusion to be drawn from this study is, that while this battery of psychoeducational measures is effective in predicting academic achievement, the battery is somewhat of a failure in predicting learning disability. With the CTBS Total as the criterion variable, the 10 variables entering the multiple regression equation account for 79% of the total variance between groups. A re-analysis of the data using the CTBS and its subtests as predictors and using membership in either the learning disabled or the control group as the criterion, yielded only 35% of the variance accounted for. When tested with a multiple regression analysis, the battery does discriminate between the two groups on the basis of achievement - but not on the basis of membership. This suggests a number of comments: (a) Accounting for only 35% of the variance after introducing all 22 variables into the regression equation seems to indicate that they are not powerful predictors. The tests employed here may have a low discriminative ability, (b) Examining the results of these tests, it is difficult to determine the qualifications for placement in a learning disability class, (c) The single most important predictor, 'L' of the A-M-L Behavior Rating Scale, only accounts for 20% of the variance. This suggests the teachers who do well when predicting achievement, err more often in predicting group membership for learning disabilities. Teachers may, for example, be more susceptible to referring disruptive students who are

behavior problems to the exclusion of the more reserved but academically troubled pupils, (d) It also seems that while teachers are good at predicting academic achievement, they are less effective at predicting personality and psychological variables. (e) When counsellors or psychologists are required to assess a child, they typically acquire background information. They may administer a behavior rating scale, an intelligence test, an achievement test and a perceptual-motor test to determine if the child is indeed learning disabled. It would appear from this research, however, that the likelihood of their being correct in their diagnostic labelling is marginal. It should be noted that a psychologist administers these instruments to a particular child and examines each score for variability from the norm, a practice not followed in this research where tests were group administered with the results then being treated collectively. It would seem reasonable that the former method would yield a better discrimination than the results here. (f) Possibly educators and psychologists are not effective in diagnosing the learning disabled child. It is a two-step process which begins with the teacher identifying the student as having problems and culminates with the psychologist verifying the teacher's observations. This screening procedure may be largely inadequate. (g) It is possible that those children identified as learning disabled in the study were, in fact, not learning disabled. This would account for the absence of expected correlations. Several

considerations must be examined however before the above inferences can either be accepted or rejected.

Accounting for only 35% of the variance of group membership, and predicting achievement much more effectively than learning disability, are reasons to assume that some unidentified factors are involved in this study. The following discussion will speculate on some of these possible influences.

One limitation of this study is the lack of control over subject selection. The learning disabled population was accepted as it existed in the school, with no other criteria to screen the sample. No test of whether these children satisfied accepted definitions was used, beyond their inclusion in learning assistance classes.

Another drawback involves the global nature of the measures used. Several of them, such as the intelligence score, the WRAT scores, and the VMI yield a gross composite score. That is, the instruments are not composed of specific subtests sensitive to individual developmental differences in the subjects. Such general measures of achievement, intelligence and motor skills may be acceptable as initial screening devices, but may be ineffective predictors in individual cases. For example, the intelligence measure is an overall composite score. Had the more specific verbal and nonverbal scores been included, it is possible that they could provide more discriminative power. Also, a verbal-nonverbal discrepancy factor, based on the magnitude of any difference between the two subscales, might

contribute to the diagnostic power of the intelligence measure. Learning disabled children typically score higher on the nonverbal subscale than on the verbal. While a difference of five points may be of little consequence, a difference of 15 points or more warrants further investigation and explanation.

A third problem is the manner in which the scores were treated for analysis. The procedures ignored the possible variation within each child's profile of scores on the several variables. In the learning disabled group, it may be that it is the relationship between variables that accounts for their learning problems. Furthermore, not all learning disabled students score uniformly low on the VMI for example, or on an achievement subtest, but some may. The learning disabled are not a homogeneous group. The single characteristic they share is a difficulty in some aspect of their schooling - they are all underachieving in some area. If individual profiles were examined for each child, this might reveal characteristics that account for their being candidates for special educational attention. To use a group score on each variable or to use all variables with equal emphasis for each child thus increases the likelihood of not seeing profile characteristics which may very well be significant determinants of their disability.

The definition of a learning disability determines to a large extent the measures one employs to diagnose children. The key elements of the accepted definitions must be examined. A child must have at least average intellectual capacity, and he must display a discrepancy between this intellectual potential and his current level of academic performance. Also, this

discrepancy may not be attributed to educational or cultural deprivation, emotional disturbance, or sensory loss. Many definitions suggest that perceptual-motor problems may be characteristic of a learning disability. Tests should validate certain aspects of the definition, and allow one to determine if it applies to a specific child or to a group.

A basic component of the definition refers to having at least average intellectual capacity. Because children are screened accordingly, one would not expect IQ to be a significant factor in differentiating the two populations. This conforms reasonably well to the findings of this study. With respect to perceptual functioning, a child may be experiencing a disorder which directly affects his ability to read, write or spell. The Beery VMI is a standard instrument used to assess visual-motor-integration functions, yet it does not differentiate between the two groups in this study. Perhaps another instrument, more sensitive to inability to plan and organize, or tapping areas such as impulsivity or frustration tolerance would reveal greater distinction between the groups. It may also be that visual-motor-integration factors are not powerful predictors of disability.

The exclusion clause in the definition rules out handicaps such as educational or cultural deprivation, emotional disturbances and sensory loss. Emotional disturbances are difficult to identify, unless one employs some measures of personality

in a test battery. Results of this research indicate moderate support for the inclusion of variables such as locus of control, aggression and academic self-confidence. Whether or not these factors violate the exclsion clause is a matter requiring clarification.

The central component of the definition is a discrepancy between intellectual potential and level of achievement. This research confirms this discrepancy. The variables which yielded the maximum discrimination between the groups on the Hotelling T^2 were achievement measures, the CTBS Language subtest, and the CTBS total, and 'L' of A-M-L, the teacher's estimate of a child's learning difficulties, which can also be considered as an estimate of a child's success. The largest portion of variance accounted for in the entire test battery was comprised of these measures. It thus appears that academic achievement is an overwhelming consideration in determining who is a learning disabled child.

The question may be posed as to whether or not this battery of psychoeducational tests reflects the prescribed definition. It could also be suggested that the definition itself be made more explicit. In either case, this battery does not apparently contain the elements necessary to discriminate between the two groups on any basis other than achievement and teacher opinion.

Recommendations

It would appear that a great deal of the confusion and controversy in the area of learning disabilities stems from how they are defined. Perhaps a neurological approach such as that advocated by Turton (1975) or Cruickshank (1979) should be adopted. Turton views learning disabilities as discrepancies in the developmental processes of the child. He maintains that intelligence and achievement scores offer little in terms of explaining the manner in which children grow, and fail to acknowledge that learning follows developmental principles (Turton, 1978). Perhaps we should acknowledge the complexity of learning and assess perception, motor skills, cognition, language skills, and social skills, as well as achievement when we are diagnosing disabilities. This would broaden the current approach and incorporate developmental facts.

Another alternative might be to adopt a definition of the learning disabled child such as that offered by Ferrald and Schamber (1973):"... any child who - for whatever reason - consistently fails to meet the demands of the curriculum to which he is assigned and whose unique learning characteristics necessitate extensive remodelling and reconstruction of teaching interventions for efficient learning." As this present study suggests, learning disabled children are placed in special classes largely on the basis of poor achievement. This seems to be the variable actually used as the selection criterion

regardless of what other psychoeducational assessments are made. The adoption of this approach would eliminate much of the confusion and perhaps help in dealing directly with the problem at hand. There are children having difficulty in the classrooms of our schools. Whether we call them learning disabled or underachievers is of little consequence if they receive the additional instructional benefits they require.

Regardless of the way learning disabilities are defined, it is necessary to emphasize the heterogeneous nature of educational problems. The characteristics of underachieving children vary greatly, and numerous terms have been employed to describe their symptoms,behaviors, psychological nature and physical traits (Wallace & McLaughlin, 1975; Baren, Liebl & Smith, 1978). Each learning disabled student exhibited a unique set of characteristics, and it is necessary to investigate the qualities of each particular child. Wallce and Kauffman (cited in Wallace & McLaughlin, 1975) state:

> ... all of these children are not hampered by identical deficiencies. In addition to extending across academic tasks, learning problems are complicated by varying degrees of difficulty, by the age of the child, and by the child's attitude toward his disability. (p. 8)

The heterogeneity of the learning disabled population necessitates an individual analysis of each learning problem. It does not appear that one can identify a single cause or a single group of causes that will effectively identify these children.

Given the elusive nature of the symptoms or the causes of a learning disability, it may be asking too much to expect an exact diagnosis of a child's specific area of difficulty. Sabatino (1976) identifies four possible areas of remediation: (1) academic, (2) perceptual-motor, (3) language, and (4) psychotherapy. There are numerous diagnostic-remedial approaches available. To effectively help a child with a learning disability requires extensive psychological and educational testing coupled with careful observation to determine areas of strength and weakness (Baren, et al., 1978). Even after such a procedure has been conducted, remedial suggestions can vary from simple classroom exercises to elaborate courses. It seems optimistic to expect special classes to strengthen the area of weakness with confidence or precision, because not all children will benefit in the same way from the same program. As Bryan and Bryan (1978) note, "... no one knows with much certainty that any of them will work, or, just what part of the program might be responsible for whatever improvement might be shown..." (p. 158). Educators therefore tend to work around the problem by carrying on in the face of uncertainty about just exactly what the problem is.

Because diagnosing a child's weaknesses has yet to prove a completely fruitful approach, it would seem reasonable for educators to seek out the child's areas of strength and to capitalize on these. A child will not develop a positive attitude towards learning if his deficiencies are habitually emphasized (Rowan, 1977). It might be better to emphasize his

strengths while practicing in moderation to improve his weaknesses. Educators should define, as best they can, approaches that a child is most likely to realize success with, and focus on these. The learning encounter could therefore be more pleasurable for all involved. Important in any remediation are the intangibles of the program. The most crucial factor in improving results may be the teacher's attitude and personality (Baren, et al., 1978; Hathaway and Rhodes, 1979). Operating from a positive, success oriented framework, the child will gain in confidence and improve his self-concept (Swindlehurst and Janzen, 1979). The teacher may preserve her patience, tolerance and sanity.

In summary, a major difficulty in this type of research pivots about the definition of learning disabilities. As Sabatino (1976) notes, current definitions seem to state more clearly what a learning disability is not than what it exactly is. There is a need for an operational definition usable in the schools. There is a need to become very descriptive and specific about the behaviors that learning disabled children exhibit. And finally, there is a need to encourage communication and interdisciplinary attention to this educational problem (Wallace and McLaughlin, 1975; Sabatino, 1976; Ohlson, 1978).

Suggestions for Further Research

Several suggestions have already been presented. These may be summarized as follows:

1. Researchers using intelligence as a measure could adopt a verbal nonverbal discrepancy factor, and use individual IQ measures rather than group tests.
2. Reserachers might examine individual profiles of test or subtest scores for each child and conduct a pattern analysis rather than simply compare test score averages across groups.
3. A predictive study could be conducted using teacher ratings and psychologists ratings to determine their relative effectiveness in predicting learning disabilities.
4. Researchers should continue to investigate affective variables, as there appear to be measurable differences between the learning disabled and other students.
5. Professionals in all related fields can work towards providing a new definition that recognizes the heterogeneity of the learning disabled population, and establishes operational criteria for diagnosis.

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APPENDICES

APPENDIX A

Wide Range Achievement Test

WIDE RANGE ACHIEVEMENT TEST

Reading, Spelling, Arithmetic from Pre-School to College

By J. F. Jastak, S. W. Bijou, S. R. Jastak

Printed in U.S.A.
1937, 1946, 1963
Revised Edition
1965

Name . . . . . Birthdate . . . . . M. F. Chron. Age . . . . . .

School . . . . . Grade . . . . . Reading Score . . . . . Grade . . . . . Stand-Sc. . . . %ile . . .

Referred by . . . . . Spelling Score . . . . . Grade . . . . . Stand-Sc. . . . %ile . . .

Date . . . . . Examiner . . . . . Arithmetic Score . . . . Grade . . . . . Stand-Sc. . . . %ile . . .

Percentiles and Standard Scores corresponding to grade ratings and age may be found in the Manual.

Level I—Spelling—Grade Norms.

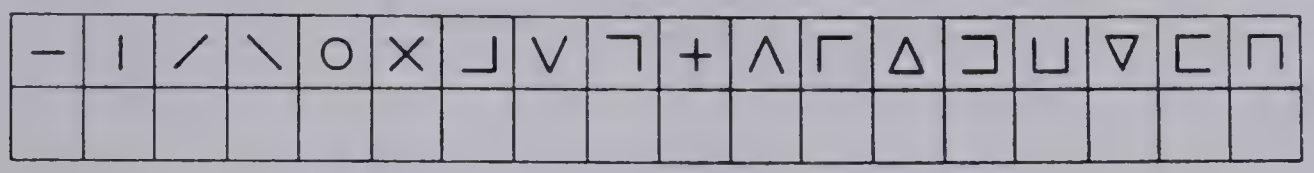
Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade
1	N.5	12	Kg.4	21	1.5	34	3.0	45	5.7	56	10.3
2	N.8	13	Kg.5	24	1.6	35	3.2	46	6.0	57	10.9
3	Pk.1	14	Kg.6	25	1.7	36	3.5	47	6.3	58	11.5
4	Pk.2	15	Kg.7	26	1.8	37	3.7	48	6.5	59	12.2
5	Pk.3	16	Kg.8	27	2.0	38	3.9	49	6.8	60	13.0
6	Pk.5	17	Kg.9	28	2.2	39	4.2	50	7.2	61	13.8
7	Pk.7	18	Gr.1.0	29	2.3	40	4.5	51	7.7	62	14.5
8	Pk.9	19	1.1	30	2.5	41	4.7	52	8.2	63	15.2
9	Kg.1	20	1.2	31	2.6	42	5.0	53	8.7	64	15.9
10	Kg.2	21	1.3	32	2.7	43	5.3	54	9.2	65	16.7
11	Kg.3	22	1.4	33	2.9	44	5.5	55	9.7		

Level II—Spelling—Grade Norms.

Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade
0	Kg.2	11	4.0	21	6.7	31	9.0	41	12.4
1	Kg.6	12	4.3	22	6.8	32	9.3	42	12.8
2	Gr.1.0	13	4.6	23	7.0	33	9.6	43	13.2
3	1.3	14	4.9	24	7.2	34	9.9	44	13.6
4	1.6	15	5.2	25	7.4	35	10.2	45	14.0
5	1.9	16	5.5	26	7.6	36	10.5	46	14.4
6	2.2	17	5.8	27	7.8	37	10.8	47	15.0
7	2.6	18	6.1	28	8.1	38	11.2	48	15.7
8	3.0	19	6.3	29	8.4	39	11.6	49	16.4
9	3.3	20	6.5	30	8.7	40	12.0	50	17.2
10	3.7							51	18.0

Spelling Scores

Level I			Level II	
Test		Cumul. Score	Test	Cumul. Score
Copying			**Copying**	
1 point	1		4-9	1
per	to		10-17	2
mark	18		18	3
Name			**Name**	
1 letter	19		1 letter	4
2 letters	20		2 letters	5
Spelling			**Spelling**	
1 point	21		1 point	6
per	to		per	to
word	65		word	51



Name . . . . . 31. . . . . .

1. . . . . 16. . . . . 32. . . . . .

2. . . . . 17. . . . . 33. . . . . .

3. . . . . 18. . . . . 34. . . . . .

4. . . . . 19. . . . . 35. . . . . .

5. . . . . 20. . . . . 36. . . . . .

6. . . . . 21. . . . . 37. . . . . .

7. . . . . 22. . . . . 38. . . . . .

8. . . . . 23. . . . . 39. . . . . .

9. . . . . 24. . . . . 40. . . . . .

10. . . . . 25. . . . . 41. . . . . .

11. . . . . 26. . . . . 42. . . . . .

12. . . . . 27. . . . . 43. . . . . .

13. . . . . 28. . . . . 44. . . . . .

14. . . . . 29. . . . . 45. . . . . .

15. . . . . 30. . . . . 46. . . . . .

Page 2. Arithmetic
LEVEL I, Oral Part

41 17 9 5 3 3 Fingers, 8 fingers. 9 or 6? 42 or 28?

3 pennies, spend 1 ? ____ ____ ; 3 + 4 apples?_____; 9 marbles, lose 3?_____

Written part.

$1 + 1 =$ ____ $4 - 1 =$ ____

$\begin{array}{r} 6 \\ +\ 2 \end{array}$ $\begin{array}{r} 5 \\ -\ 3 \end{array}$ $\begin{array}{r} 32 \\ 24 \\ +\ 40 \end{array}$ $4 \times 2 =$ _____ $\begin{array}{r} 23 \\ \times\ 3 \end{array}$ $\begin{array}{r} 29 \\ -\ 18 \end{array}$ $\begin{array}{r} 75 \\ +\ 8 \end{array}$

$\begin{array}{r} 452 \\ 137 \\ +\ 245 \end{array}$ $6 \div 2 =$ _____ $\begin{array}{r} \$62.04 \\ -\ 5.30 \end{array}$ $1\frac{1}{2}$ hr. = ____min. $6\overline{)968}$

$\frac{1}{3} + \frac{1}{3} =$ _____

$\frac{15}{5} =$ _____ $\frac{7}{9} - \frac{5}{9} =$ _____ $\begin{array}{r} 823 \\ \times\ 96 \end{array}$ $\begin{array}{r} 4\frac{5}{6} \\ 3\frac{1}{3} \\ +\ 2\frac{1}{2} \end{array}$ $\frac{2}{5}$ of 35 = _____

$\frac{1}{2}$ yd. = _____in. $1\frac{3}{4} = \frac{\quad}{4}$

$27\overline{)384}$ $\frac{3}{4}$ yr. = _____mo. Multiply: $\begin{array}{r} 7.96 \\ \times\ 30.8 \end{array}$

$\frac{2}{3} = \frac{\quad}{12}$ $\begin{array}{r} 5 \\ -\ 1\frac{1}{3} \end{array}$ $2\frac{1}{3}$ doz. = _____

Which is more?
$\frac{7}{8}$ or $\frac{13}{15}$ Ans. _____

Find the average of
24, 18, 21, 26, 17
Ans. _____

Write as a percent
$\frac{3}{4}$ = _____%

$4\frac{1}{5} \times 3\frac{1}{3} =$ _____

$\frac{3}{10} \div \frac{3}{4} =$ _____ $\frac{8}{9} \times \frac{9}{4} \times \frac{1}{2} =$ _____

Write as decimal:
$\frac{2}{3} =$ _____

20% of 120 = _____

$8.2\overline{)62.703}$

Change to familiar numerals:
MCXLII = _____

$(-5)(+9) =$ _____

$6^2 =$ _____

Find interest on
$300 at $4\frac{1}{2}\%$ for 7 mo.
Ans. _____

Solve:
$y + (9 - 8y) = 65$
$y =$ _____

Find square root: $\sqrt{3\,3\,4.8\,9}$

Percentiles and Standard Scores corresponding to grade ratings and age may be found in the Manual.

Arithmetic—Level I—Grade Norms

Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade	Score	Grade
1	N.5	8	Kg.1	15	Kg.9	22	2.1	29	3.6	36	5.3	43	6.7	50	10.0	57	16.9
2	N.8	9	Kg.2	16	Gr.1.0	23	2.2	30	3.9	37	5.5	44	7.0	51	10.7	58	15.6
3	Pk.1	10	Kg.3	17	1.2	24	2.4	31	4.2	38	5.7	45	7.2	52	11.4	59	16.3
4	Pk.2	11	Kg.4	18	1.4	25	2.6	32	4.5	39	5.9	46	7.6	53	12.1		
5	Pk.3	12	Kg.5	19	1.6	26	2.8	33	4.7	40	6.1	47	8.2	54	12.8		
6	Pk.6	13	Kg.6	20	1.8	27	3.0	34	5.0	41	6.3	48	8.8	55	13.5		
7	Pk.8	14	Kg.7	21	1.9	28	3.2	35	5.2	42	6.5	49	9.4	56	14.2		

APPENDIX B

Beery Developmental Test of Visual-Motor

Integration

Personal Data

NAME _____ SEX: M _____ F _____
last first

SCHOOL _____ GRADE _____

EXAMINER _____ DATE OF TEST _____
year month day

BIRTH DATE _____
year month day

AGE _____
years months days

VMI *Scoring*

1. Number of forms completed up to 3 consecutive failures _____
2. Number of forms failed up to 3 consecutive failures _____
3. Subtract line 2 from line 1 to obtain VMI Raw Score _____

See Page 66 of the *Administration and Scoring Manual* to find VMI Age Equivalent

VMI Raw Score _____

VMI Age Equivalent _____

Visual Abilities and Needs

_____

_____

_____

_____

_____

_____

_____

_____

_____

Motor Abilities and Needs

_____

_____

_____

_____

_____

_____

_____

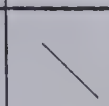
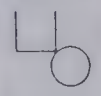
_____

_____

Other Data, Comments, and Recommendations _____

_____

_____

No.	Form	Pass or Fail (P-F)	Observations and Comments
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
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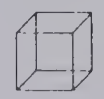
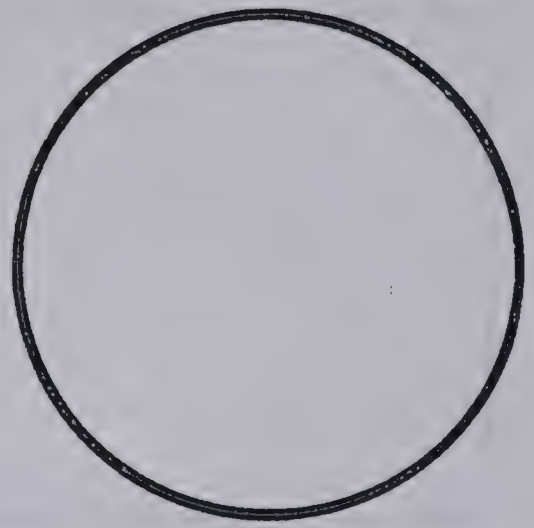
22			
23			
24			

Let's draw! Do you have a pencil? Remember—one try and no *erasing. Keep the booklet straight in front of you and don't tilt it. Just do the best you can on the hard ones, and don't skip any.*

Please turn page to begin.

 1	 2	 3
1	2	3

4

5

6

4

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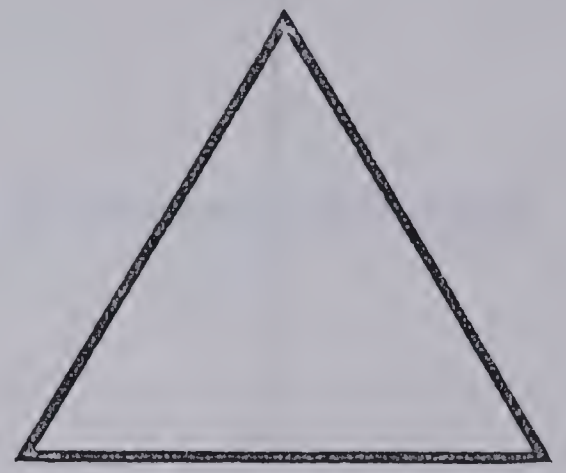
 7	 8	 9
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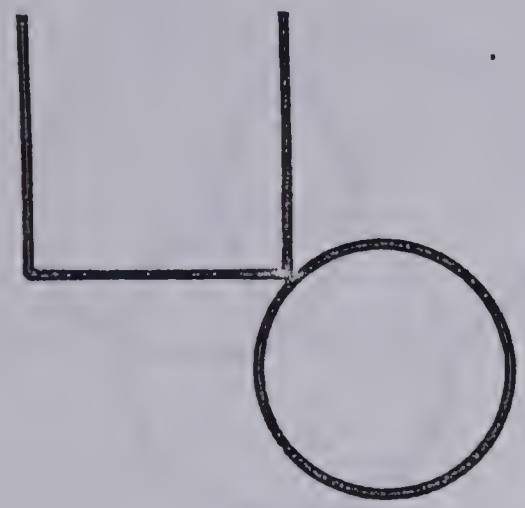

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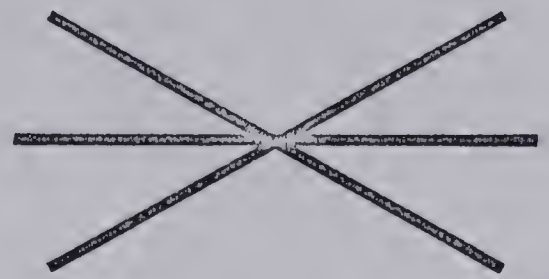

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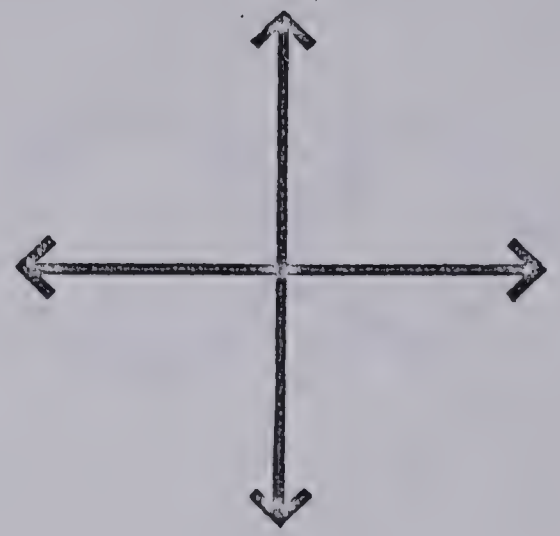

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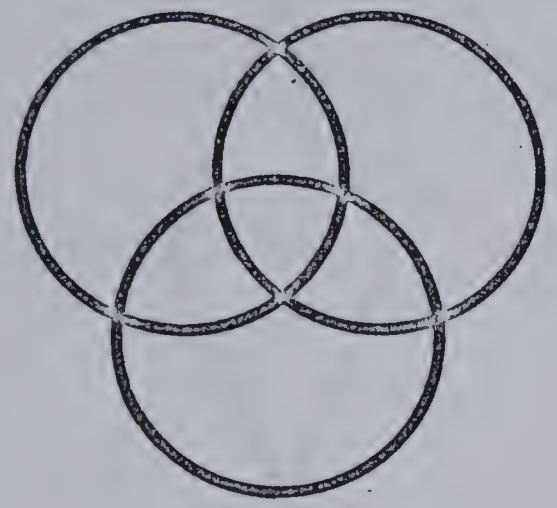

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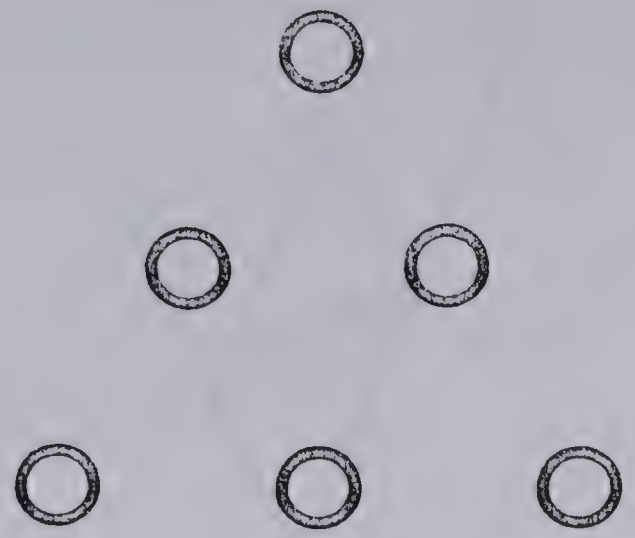

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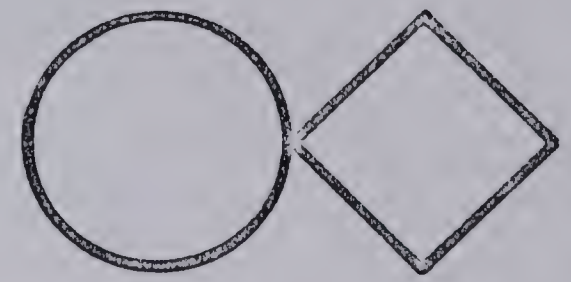

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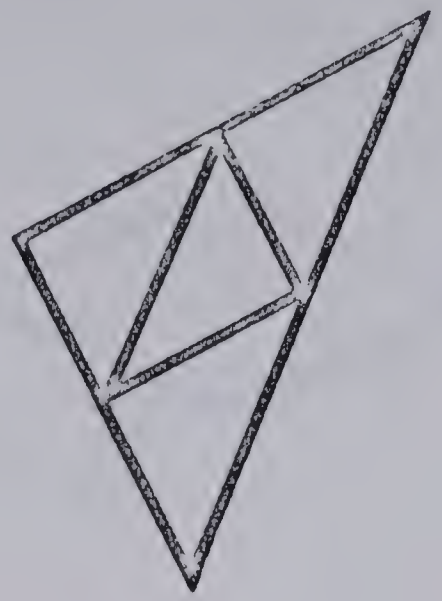

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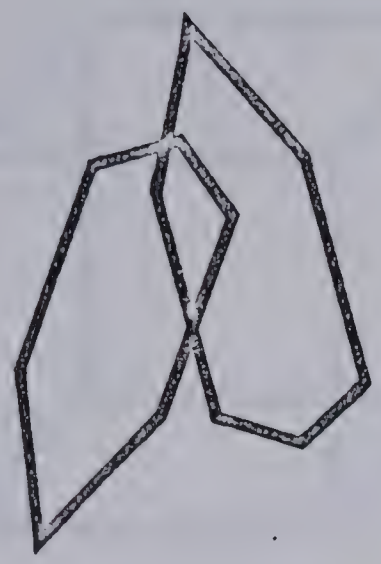

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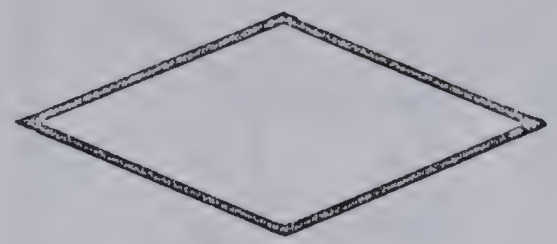

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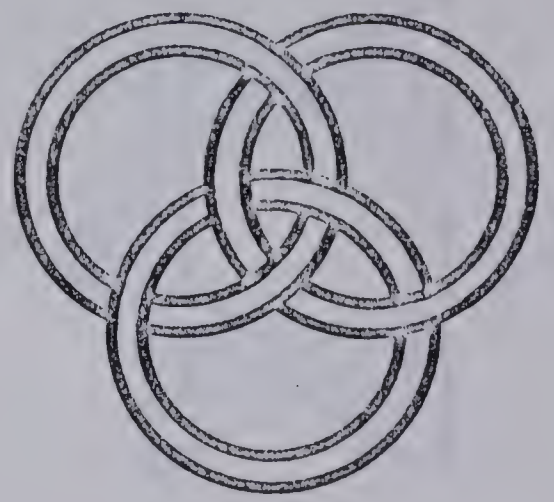

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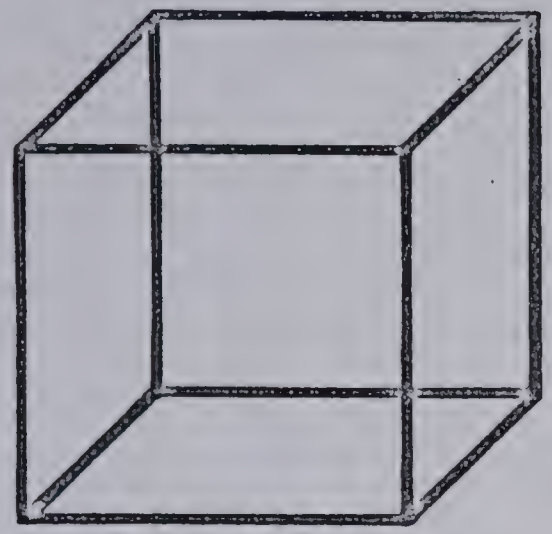

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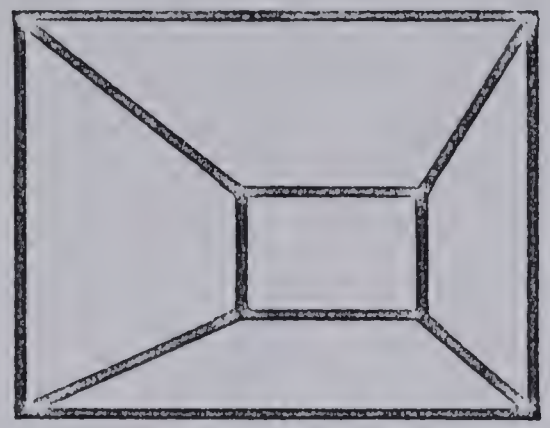

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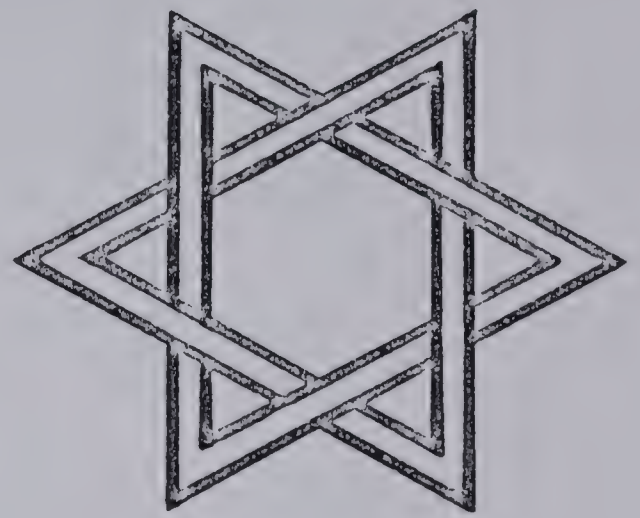

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APPENDIX C

A-M-L Behavior Rating Scale

A-M-L BEHAVIOR RATING SCALE

The School, as a major "helping agency", has key responsibility for implementing secondary preventive techniques in the interest of mental health. The early identification of young children with problem behavior is an important prerequisite to the process of early intervention.

The school classroom provides an opportunity for direct observation of children over a period of time and under a variety of circumstances. The A-M-L Behavior Rating Scale serves the purpose of helping the teacher record, in an orderly fashion, various kinds of observed behavior in children. The frequency with which these behavior characteristics occur and their duration are important considerations.

FREQUENCY: is checked on the 5-point A-M-L Scale from "Seldom or Never" - to - "All of the Time".

DURATION: is based on the criterion that the teacher observing and rating children shall have been their classroom teacher for a period of not less than 4 consecutive months.

The 11-item A-M-L Scale may be summarized as follows:

A- aggressive-outgoing behavior (Items 1, 3, 5, 7, 9)

M- moody - internalized behavior (Items 2, 4, 6, 8, 10)

L- learning (Item 11)

* * * * *

SPECIAL INSTRUCTIONS TO TEACHERS

It will contribute to the validity of the results if you will -

1) READ EACH STATEMENT CAREFULLY.

2) CHECK EACH STATEMENT ON THE BASIS OF YOUR DIRECT OBSERVATIONS ONLY.

* * * * *

YOU WILL NEED ONE A-M-L RATING SCALE FORM PER PUPIL IN YOUR CLASSROOM.

- - - - - - - - -

Thank you for your time and help!

Pupil _____

Sex _____

Date of Rating _____

A)M(L BEHAVIOR RATING SCALE

PLEASE RATE THIS PUPIL'S BEHAVIOR AS YOU HAVE OBSERVED AND EXPERIENCED IT: THIS PUPIL -	Seldom or Never (1)	Not Very Often (2)	Often (3)	Most of the Time (4)	All of the Time (5)	
(A) 1. Gets into fights or quarrels with other pupils	☐	☐	☐	☐	☐	1.
(M) 2. Has to be coaxed or forced to work or play with other pupils	☐	☐	☐	☐	☐	2.
(A) 3. Is very restless	☐	☐	☐	☐	☐	3.
(M) 4. Is unhappy or depressed	☐	☐	☐	☐	☐	4.
(A) 5. Enjoys disrupting class discipline	☐	☐	☐	☐	☐	5.
(M) 6. Becomes sick when faced with a difficult school problem or situation	☐	☐	☐	☐	☐	6.
(A) 7. Is very obstinate	☐	☐	☐	☐	☐	7.
(M) 8. Is overly sensitive to criticism	☐	☐	☐	☐	☐	8.
(A) 9. Is very impulsive	☐	☐	☐	☐	☐	9.
(M) 10. Can be very moody	☐	☐	☐	☐	☐	10.
(L) 11. Has difficulty learning	☐	☐	☐	☐	☐	L____
						A____
						M____
						T____

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January, 1978

APPENDIX D

Academic Achievement Accountability

Scale

BOY ☐

NAME: _____ _____ GRADE: _____ GIRL ☐
(First) (Last)

Here are some questions that ask how you feel about school. There is no right answer; just tell how *you* feel by putting an "X" in one box for each question.

EXAMPLE: Do you like music? [YES!] [yes] [?] [no] [NO!]

Put the X on [YES!] if you *really love* music; [yes] if you *kind of like* music; [?] if you are not sure; [no] if you *do not like* music very much; and [NO!] if you *hate* music.

Now answer these questions.

1.	Do your marks get worse when you don't work hard?	[YES!]	[yes]	[?]	[no]	[NO!]
2.	Do your marks stay about the same no matter how hard you study?	[YES!]	[yes]	[?]	[no]	[NO!]
3.	Does studying before a test seem to help you get a higher score?	[YES!]	[yes]	[?]	[no]	[NO!]
4.	When you make up your mind to work hard, does your school work get better?	[YES!]	[yes]	[?]	[no]	[NO!]
5.	Do you think studying for tests is a waste of time?	[YES!]	[yes]	[?]	[no]	[NO!]
6.	Do your marks get better when you do your homework carefully?	[YES!]	[yes]	[?]	[no]	[NO!]
7.	When you do worse than usual, do you feel it's your fault?	[YES!]	[yes]	[?]	[no]	[NO!]
8.	Do you have much control over the marks you get?	[YES!]	[yes]	[?]	[no]	[NO!]
9.	When a teacher gives you a low mark is it because he doesn't like you?	[YES!]	[yes]	[?]	[no]	[NO!]
10.	When you really want a better mark than usual can you get it?	[YES!]	[yes]	[?]	[no]	[NO!]
11.	Do your lowest grades come when you don't study your assignment?	[YES!]	[yes]	[?]	[no]	[NO!]
12.	Do your test marks seem to go up when you study?	[YES!]	[yes]	[?]	[no]	[NO!]
13.	Is a high mark just a matter of "luck" for you?	[YES!]	[yes]	[?]	[no]	[NO!]
14.	Do you think you deserve the marks you get?	[YES!]	[yes]	[?]	[no]	[NO!]
15.	Do you usually get low marks even when you study hard?	[YES!]	[yes]	[?]	[no]	[NO!]
16.	Are tests just a lot of guess work for you?	[YES!]	[yes]	[?]	[no]	[NO!]
17.	If you get a bad mark, do you feel it's your fault?	[YES!]	[yes]	[?]	[no]	[NO!]
18.	When you do poorly in school work do you feel that you could have done better if you had wanted to?	[YES!]	[yes]	[?]	[no]	[NO!]

APPENDIX E

Student's Perception of Ability Scale

The authors would not release the SPAS for placement in this Appendix. For further information contact:-

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c/o University of Alberta,

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Edmonton, Alberta, Canada.

APPENDIX F

Correlation Matrix for all Variables

TABLE 6

Correlation Matrix for all Variables

	Group	IQ	VMI	A	M	L	AML	- AAA	WHAT Spelling	WRAT Arith.	CTBS Vocab.	CTBS Rdg. Comp.	CTBS Lang.	CTBS Work Study Skills	CTBS Math.	CTBS Total	SPAS General Ability	SPAS Arith.	SPAS School Satis-faction	SPAS Rdg. Spelling	SPAS Penman-ship/ neatness	SPAS Confi-dence	SPAS Full Scale
Group	1.0	-0.28	-0.09	-0.01	0.07	0.45	0.11	-0.25	-0.37	-0.25	-0.28	-0.30	-0.42	-0.30	-0.36	-0.39	-0.07	-0.12	-0.17	-0.15	-0.11	-0.01	-0.16
IQ	-0.28	1.00	0.30	-0.23	-0.22	-0.66	-0.35	0.11	0.44	0.35	0.56	0.60	0.66	0.63	0.64	0.71	0.17	0.19	0.08	0.27	-0.04	0.22	0.21
VMI	-0.09	0.30	1.00	-0.20	-0.03	-0.20	-0.16	0.12	0.33	0.41	0.35	0.27	0.28	0.48	0.40	0.40	0.26	0.18	0.07	0.12	0.08	0.18	0.21
A	-0.01	-0.23	-0.20	1.00	0.60	0.24	0.89	-0.16	-0.18	-0.04	-0.21	-0.27	-0.29	-0.27	-0.21	-0.29	-0.17	-0.08	-0.04	-0.13	-0.17	-0.15	-0.18
M	0.07	-0.22	-0.03	0.60	1.00	0.29	0.88	-0.11	-0.07	0.05	-0.16	-0.20	-0.25	-0.20	-0.19	-0.24	-0.15	-0.16	-0.05	-0.13	-0.17	-0.10	-0.19
L	0.45	-0.66	-0.20	0.24	0.29	1.00	0.43	-0.22	-0.54	-0.37	-0.58	-0.59	-0.70	-0.61	-0.62	-0.71	-0.24	-0.23	-0.10	-0.36	-0.02	-0.25	-0.29
AML	0.11	-0.35	-0.16	0.89	0.88	0.43	1.00	-0.18	-0.23	-0.06	-0.30	-0.35	-0.41	-0.36	-0.32	-0.41	-0.21	-0.17	-0.07	-0.21	-0.18	-0.18	-0.24
AAA	-0.25	0.11	0.12	-0.16	-0.11	-0.22	-0.18	1.00	0.33	0.26	0.24	0.19	0.29	0.21	0.27	0.28	0.30	0.39	0.49	0.30	0.34	0.24	0.50
WRAT Spelling	-0.37	0.44	0.33	-0.18	-0.07	-0.54	-0.23	0.33	1.00	0.60	0.60	0.54	0.69	0.59	0.56	0.68	0.31	0.26	0.25	0.54	0.11	0.32	0.43
WRAT Arith.	-0.25	0.35	0.40	-0.04	0.05	-0.37	-0.06	0.26	0.60	1.00	0.52	0.43	0.47	0.63	0.63	0.60	0.29	0.38	0.19	0.26	-0.03	0.34	0.33
CTBS Vocab.	-0.28	0.56	0.35	-0.21	-0.16	-0.58	-0.30	0.24	0.60	0.52	1.00	0.77	0.69	0.74	0.73	0.84	0.38	0.26	0.03	0.38	0.00	0.35	0.33
CTBS Reading Comp.	-0.30	0.60	0.27	-0.27	-0.20	-0.59	-0.35	0.19	0.54	0.43	0.77	1.00	0.71	0.75	0.69	0.86	0.36	0.24	0.03	0.38	0.02	0.34	0.32
CTBS Lang.	-0.42	0.66	0.28	-0.29	-0.25	-0.70	-0.41	0.29	0.69	0.47	0.69	0.71	1.00	0.74	0.71	0.90	0.31	0.25	0.18	0.48	0.14	0.31	0.40
CTBS Work study skills	-0.30	0.63	0.48	-0.27	-0.20	-0.61	-0.36	0.21	0.59	0.63	0.74	0.75	0.74	1.00	0.83	0.92	0.31	0.32	0.07	0.35	0.06	0.37	0.35
CTBS Math.	-0.36	0.64	0.40	-0.21	-0.19	-0.62	-0.32	0.27	0.56	0.63	0.73	0.69	0.70	0.83	1.00	0.88	0.33	0.32	0.11	0.33	0.02	0.34	0.34
CTBS Total	-0.39	0.71	0.40	-0.29	-0.24	-0.71	-0.41	0.28	0.68	0.60	0.84	0.86	0.90	0.92	0.88	1.00	0.37	0.32	0.11	0.44	0.07	0.38	0.40
SPAS General Ability	-0.07	0.17	0.26	-0.17	-0.15	-0.24	-0.21	0.30	0.31	0.29	0.38	0.36	0.31	0.31	0.33	0.37	1.00	0.45	0.24	0.60	0.36	0.54	0.76
SPAS Arith.	-0.12	0.19	0.18	-0.08	-0.16	-0.23	-0.17	0.39	0.26	0.38	0.26	0.24	0.25	0.32	0.32	0.32	0.45	1.00	0.33	0.35	0.31	0.42	0.69
SPAS School Satisfac-tion	-0.17	0.08	0.06	-0.04	-0.05	-0.10	-0.07	0.49	0.25	0.19	0.03	0.03	0.18	0.07	0.11	0.11	0.24	0.33	1.00	0.29	0.36	0.25	0.60
SPAS Reading Spelling	-0.15	0.27	0.12	-0.13	-0.13	-0.36	0.21	0.30	0.54	0.26	0.38	0.38	0.48	0.35	0.33	0.44	0.60	0.35	0.29	1.00	0.35	0.50	0.76
SPAS Penman-ship/ neatness	-0.11	-0.04	0.08	-0.17	-0.17	-0.02	-0.18	0.34	0.11	-0.03	0.00	0.02	0.14	0.06	0.02	0.07	0.36	0.31	0.36	0.35	1.00	0.26	0.66
SPAS Confidence	-0.01	0.22	0.18	-0.15	-0.10	-0.25	-0.18	0.24	0.32	0.34	0.35	0.34	0.31	0.37	0.34	0.38	0.54	0.42	0.25	0.50	0.26	1.00	0.67
SPAS Full Scale	-0.16	0.21	0.21	-0.18	-0.19	-0.29	-0.24	0.50	0.43	0.33	0.33	0.32	0.40	0.35	0.34	0.40	0.76	0.69	0.60	0.76	0.66	0.67	1.00